



2022 ELECTRIC RELIABILITY PERFORMANCE REPORT

Office of Resilience and Emergency Preparedness

June 2023

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EXECUTIVE SUMMARY

The attached report presents the staff of the Department of Public Service (Staff) assessment of electric reliability performance in New York State for 2022. The Public Service Commission (Commission) primarily relies on two metrics commonly used in the industry to measure reliability performance: the System Average Interruption Frequency Index (SAIFI or frequency) and the Customer Average Interruption Duration Index (CAIDI or duration).¹ Frequency is influenced by factors such as system design, capital investment, maintenance, and weather. Decisions made by utilities today on capital expenditures and maintenance policies, however, can take several years before being fully reflected in the frequency measure. Duration, on the other hand, is affected by work force levels, management of the workforce, and geography.

Several means have been established to monitor the level of service provided to New York State customers. First, utilities are required to submit detailed monthly interruption data to the Commission.² Next, the Commission adopted Service Standards, which among other things, set minimum performance levels for both the frequency and duration of service interruptions for each major electric utility's operating divisions. Each utility's performance is then compared with its Reliability Performance Mechanisms (RPMs), which are established in the most recent rate plan for that utility. The RPMs include company-wide targets for outage frequency and duration; some RPMs have additional measures to address specific concerns unique to an individual company. RPMs are designed such that companies are subject to negative revenue adjustments for failing to meet electric reliability targets excluding major storms.³ Unlike the investor-owned

¹ SAIFI is the average number of times that a customer is interrupted for five minutes or more during a year. CAIDI is the average interruption duration time in hours for those customers that experience an interruption during the year.

² The regulated electric utilities consist of Consolidated Edison Company of New York, Inc. (Con Edison), Central Hudson Gas & Electric Corporation (Central Hudson), New York State Electric & Gas Corporation (NYSEG), Niagara Mohawk Power Corporation, d/b/a National Grid (National Grid), Rochester Gas and Electric Corporation (RG&E), and Orange & Rockland Utilities, Inc. (Orange & Rockland). PSEG Long Island LLC (PSEG-LI) provides interruption data that is used to calculate statewide performance in this report.

³ Negative revenue adjustments are paid by shareholders and not by rate payers.

utilities, for PSEG-LI, the Commission does not establish rate plans nor RPMs, but PSEG-LI does have performance metrics associated with reliability set as part of an Operating Service Agreement.⁴

In addition to Staff's review, the utilities are required to perform a reliability analysis. Each utility must submit a report by March 31 of each year containing detailed assessments of performance, including historic performance for the preceding five years, outage trends in the utility's various geographic regions, reliability improvement projects, analyses of worst-performing feeders, and, where needed, corrective action plans. Recent data is also compared with historic performance to identify positive or negative trends.

By compiling the interruption data provided by the individual utilities, the average statewide frequency and duration of interruptions can assess the overall reliability of electric service in New York State. Excluding major storms, the statewide interruption frequency performance for 2022 is better than last year and slightly better than the statewide five-year average (as shown in Figure 1, page 6).⁵ The 2022 frequency performance for all utilities other than Con Edison was also better than last year and in line with the five-year average. Statewide, the three major causes for interruptions, excluding storms, were equipment failures, tree contacts, and accidents or events not under the utility's control.⁶ These three categories combined account for approximately 77 percent of all interruptions.

Excluding major storms, the statewide interruption duration performance was better than both the 2021 duration index and five-year average, as it was shorter by

⁴ Amended and Restated Operations Services Agreement between Long Island Lighting Company d/b/a LIPA and PSEG Long Island LLC, Dated as of April 1, 2022. (<https://www.lipower.org/wp-content/uploads/2022/04/2nd-AR-OSA-in-effect-on-4-1-2022.pdf>).

⁵ 16 NYCRR 97.1 defines a Major Storm as any storm which causes service interruptions of at least ten percent of customers in an operating area, or if the interruptions last for 24 hours or more. To balance between service interruptions under a utility's control, such as equipment failures, and those which a utility's control is more limited, such as an ice storm, Staff reviews reliability data both including and excluding severe weather events.

⁶ 16 NYCRR 97.5 defines accidents or events not under utility's control as interruptions resulting from events not under the control of the utility or its employees or contractors, such as house fires not caused by the utility's service; gun fire; crane contacts; automobile accidents; squirrel, bird, or other animal contacts; sabotage; customer tree fellings; etc.

approximately 5.4 and 4.8 minutes, respectively (as shown in Figure 2, page 7). The statewide interruption duration index performance, excluding Con Edison,⁷ was also shorter than 2021 and the statewide five-year average, by 3.0 and 2.4 minutes, respectively.

The state experienced 34 separate storm events that qualified as major storms in 2022. While this is four less events than 2021, customers affected by major storms increased 31 percent and customer hours of interruption nearly doubled, increasing 100 percent. This significant increase in customers affected and customer hours can be attributed to three separate storm events that occurred in February, April and December of 2022.

Central Hudson, Con Edison, National Grid, Orange & Rockland, PSEG-LI and RG&E met their reliability targets in 2022. NYSEG failed its target for frequency for the fourth consecutive year, incurring a negative revenue adjustment of \$7 million. NYSEG's frequency was 1.45, higher than the performance target of 1.20. Tree contacts continued to be the single largest contributor to system interruptions in 2022; accounting for 42 percent of the interruptions and affecting approximately 500,000 customers. As part of its 2020 Rate Order for NYSEG, the Commission authorized an expanded distribution vegetation management budget for NYSEG to fund additional trimming.⁸ The 2020 NYSEG Rate Order also authorized a Reclamation Program focused on trimming areas that NYSEG had not trimmed in over five years and a Danger Tree Program to address danger trees outside of NYSEG's distribution right-of-way. Although NYSEG experienced a decrease in the number of outages due to trees inside the right-of-way from 2020 to 2022, there was an increase in the number of outages due to trees from outside the right-of-way over that same period. This increase in tree contact outages from 2021 compounded with increases in pre-arranged outages and accidents or events not under the utility's control, led the NYSEG to again fail to meet its frequency performance target. NYSEG appropriately

⁷ Con Edison's underground system is less prone to interruptions than overhead systems and Con Edison serves approximately a third of the state's electric customers. This combination can skew the statewide metrics.

⁸ Case 19-E-0378, NYSEG – Electric Rates, Order Approving Electric and Gas Rate Plans in Accord with Joint Proposal, with Modifications (issued November 19, 2020) (2020 NYSEG Rate Order), p. 82

spent its allotted Danger Tree budget over the most recent three-year rate period, but the Company's reliability performance over that same time indicates that there is need for improvement. NYSEG must better develop its approach to identify and remove hazard trees from outside the right of way in order to deliver improved reliability benefits to customers. In order to address this issue, the Director of the Office of Resilience and Emergency Preparedness will request by letter that NYSEG provide a report to him detailing proposed improvements and revisions to their approach by August 31, 2023.

INTRODUCTION

The Commission's regulations require utilities delivering electricity in New York State to collect and submit information to the Commission regarding electric service interruptions on a monthly basis.⁹ The Commission also adopted electric service standards addressing the reliability of electric service provided to end-use customers in New York. The standards contain minimum acceptable performance levels for both the frequency and duration of service interruptions for each major electric utility's operating divisions.¹⁰ The Commission then sets, company-wide performance expectations by establishing RPMs in rate orders for each utility. PSEG-LI is the exception, as its performance expectations are set in the Operating Service Agreement. The RPMs are designed such that companies are subjected to negative revenue adjustments for failing to meet the associated reliability targets.

The interruption data submitted by the utilities enables Staff to calculate two primary performance metrics: SAIFI or outage frequency and CAIDI or outage duration. The utilities group frequency data into 10 categories that delineate the cause of the interruption (cause code).¹¹ Analysis of the cause code data enables the utilities and Staff to identify areas where increased capital investment or maintenance is needed. As an example, if a circuit were shown to be prone to lightning-caused interruptions, arrestors could be installed on that circuit to minimize the effect of future lightning strikes. In general, utility interruptions typically result from major storms, equipment failures, tree contacts, and accidents.¹² Staff maintains interruption data from 1989 to the present in a database, which enables the observation of trends. The utilities must submit a formal

⁹ 16 NYCRR § 97.3, Retention of records, requires utilities to keep detailed back-up data for six years.

¹⁰ There are no revenue adjustments for failure to meet a minimum level under the electric service standards; utilities are, however, required to include a corrective action plan as part of the annual report.

¹¹ 16 NYCRR §97.5, Information to be contained in reports, specifies and defines the following ten cause codes that reflect the nature of the interruptions: major storms, tree contacts, overloads, operating errors, equipment failures, accidents, prearranged interruptions, customers equipment, lightning, and unknown. Con Edison exclusively uses an additional seven cause codes for its underground network system.

¹² The accident cause code covers events not entirely within in the utilities' control including vehicular accidents, sabotage, and animal contacts. Lightning is reported under a separate cause code.

reliability report by March 31 of each year that compares data against both the system-wide RPM targets and the operating division targets established in the Commission's Service Standards. The RPMs include company-wide targets for outage frequency and duration. Some RPMs have additional measures to address specific concerns unique to an individual company.

2022 RELIABILITY PERFORMANCE

The following sections provide a summary discussion of the reliability performance statewide and for each of the major utilities. Individual company discussions identify issues or actions within each company that influenced performance levels for 2022 and indicate company-specific trends where applicable. Each year, Staff prepares an Interruption Report summarizing the monthly interruption data submitted by New York's utilities. The 2022 Interruption Report contains detailed interruption data for each utility and statewide statistics for the past five years. The Interruption Report for 2022 is attached as an Appendix to this report

This report presents interruption data in two ways – with major storms excluded and with major storms included. Major storm interruptions are excluded from the data used in calculating performance levels for service standards and reliability performance mechanisms. This exclusion achieves a balance between service interruptions under a utility's control, such as equipment failures and line maintenance, and those over which a utility's control is more limited, such as a severe ice storm or a heavy wet snowstorm. Reliability performance data inclusive of major storms reflects the overall customer experience during a year.

STATEWIDE - Excluding Major Storms

For many years, Staff has combined individual utility performance statistics into overall statewide statistics. By doing so, Staff can evaluate the level of reliability provided statewide and identify statewide trends. Since Con Edison's system includes

many large, highly concentrated distribution networks that are generally less prone to interruptions than overhead systems, its interruption frequency may be extremely low (better) compared to the other utilities. This, combined with the fact that it serves the largest number of customers in the state, typically results in a skewing of the performance measures. As a result, Staff examines and presents aggregated data both including and excluding Con Edison's data.

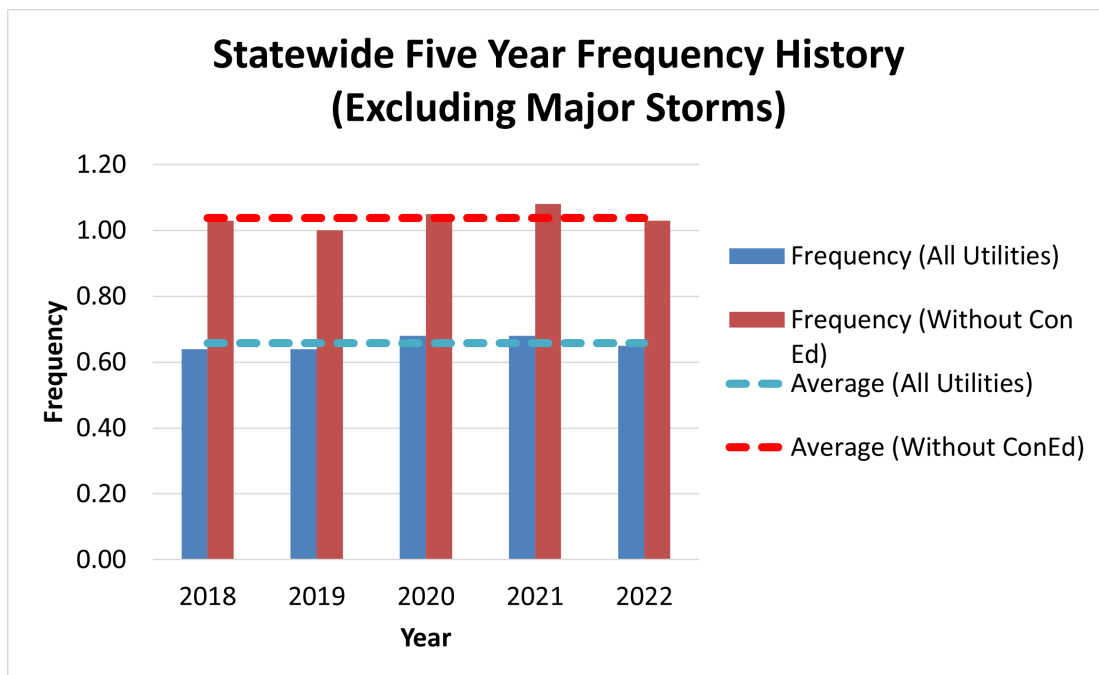


Figure 1: Statewide Frequency Performance

Statewide, as shown in Figure 1, the frequency of interruptions performance (frequency performance) in 2022 was better than the frequency performance in 2021. Excluding major storms, the frequency performance was 0.64 in 2022, which is approximately six percent better than 2021's frequency performance of 0.68. This frequency performance is also slightly better than the five-year average of 0.65. The frequency performance in 2022 for all utilities other than Con Edison was 1.03, which is approximately five percent higher than the performance in 2021 of 1.08, and equal to the five-year average performance 1.03. When including major storms, the statewide

frequency performance was 0.87, and 1.43 for utilities other than Con Edison, indicating the effect that the large number of customers interrupted and customer hours of interruption due to major storms would have on the other utilities' reliability performance in 2022 if these interruptions were not excluded from calculations.

The major causes for interruptions excluding storms were equipment failures, tree contacts, and accidents. These three causes combined accounted for nearly 77 percent of all interruptions in 2022. To reduce the frequency of interruptions, the utilities invest in numerous capital projects, inspections, and maintenance activities. Projects targeted to reduce equipment failures include adding, updating, or replacing equipment and strengthening transmission and distribution lines. For example, to reduce the possibility of outages, utilities install reclosers and other protective devices on circuits. Detailed project descriptions aimed at reducing the frequency of interruptions can be found in the utility specific sections.

Figure 2, below, shows the historical statewide interruption duration index, excluding major storms. The 2022 overall statewide interruption duration index of 1.90 hours is an improvement of 5.4-minutes compared to the previous year's duration index of 1.99 hours and an improvement of 4.8-minute compared to the statewide five-year average of 1.98 hours. Central Hudson's, Con Edison's, RG&E's and NYSEG's duration performance improved from 2021. The statewide interruption duration index, excluding Con Edison, was 1.83 hours in 2022, which is three minutes better than 2021 and 2.4 minutes better than the statewide five-year average of 1.87 hours. This example shows the significant impact Con Edison's performance has on the statewide statistics. The 2022 duration index excluding Con Edison was the best performance in the past five years.

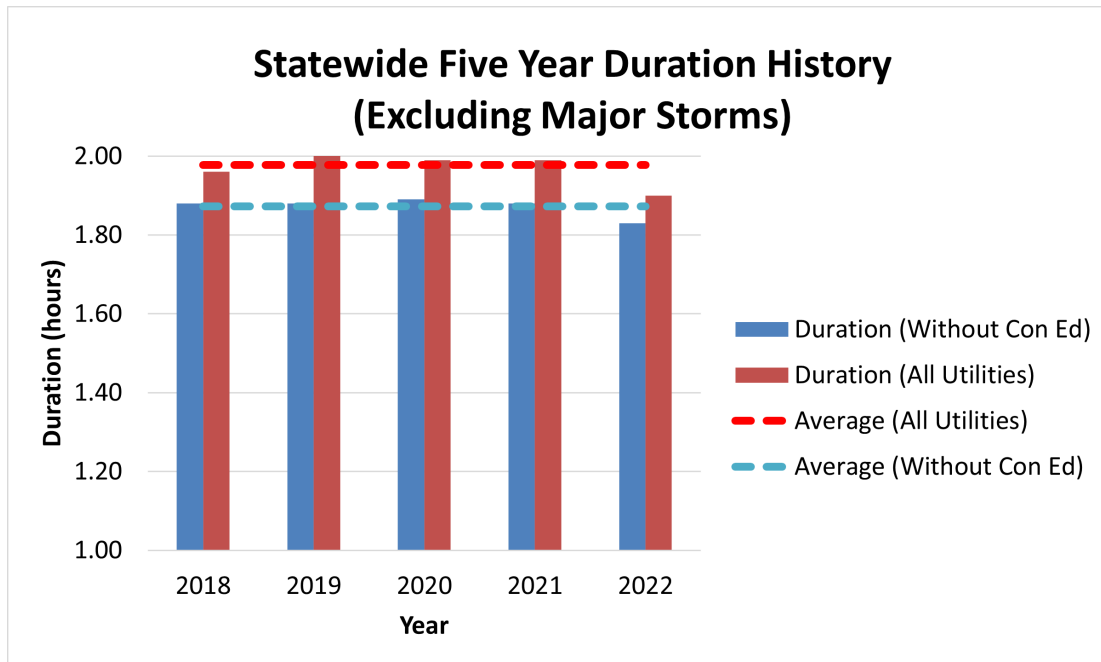


Figure 2: Statewide Duration Performance

STATEWIDE - Including Major Storms

As detailed below there were fewer major storms in 2022 than in 2021. Including major storms, both the statewide interruption duration index and the statewide interruption duration index excluding Con Edison worsened, indicating that the fewer 2022 storms had a greater impact on customers. The 2022 overall statewide interruption duration index excluding Con Edison of 4.00 hours is approximately one hour and 17 minutes longer than the 2021 duration index of 2.71 hours, but nearly 34 minutes shorter than the statewide five-year average of 4.56 hours. The statewide interruption duration index was 3.90 hours in 2022, which is one hour and seven minutes longer than the 2021 duration index of 2.79 hours and one hour and 10 minutes shorter than the statewide five-year average of 5.06 hours.

The state experienced 34 separate storm events that qualified as major storms in 2022, which generally impacted upstate service territories more than those downstate. These storms subjected the electric systems to damaging winds, rain, thunderstorms, snow, and/or ice. Of the 34 major storm events, eight impacted Central Hudson, four impacted Con Edison, 13 impacted National Grid, 20 impacted NYSEG, two impacted Orange &

Rockland, two impacted PSEG-LI and 12 impacted RG&E. While this is four less total events than the 38 events in 2021, the severity of these storm events was greater than those of last year, as customers affected by major storms increased 31 percent and customer hours of interruption doubled, increasing by 100 percent. As can be seen in Figure 3, 2022 saw an uptick in the duration of service interruptions caused by major storms over 2021. This significant increase in customers affected and customers hours can be attributed to three separate storm events that occurred in February, April and December of 2022.

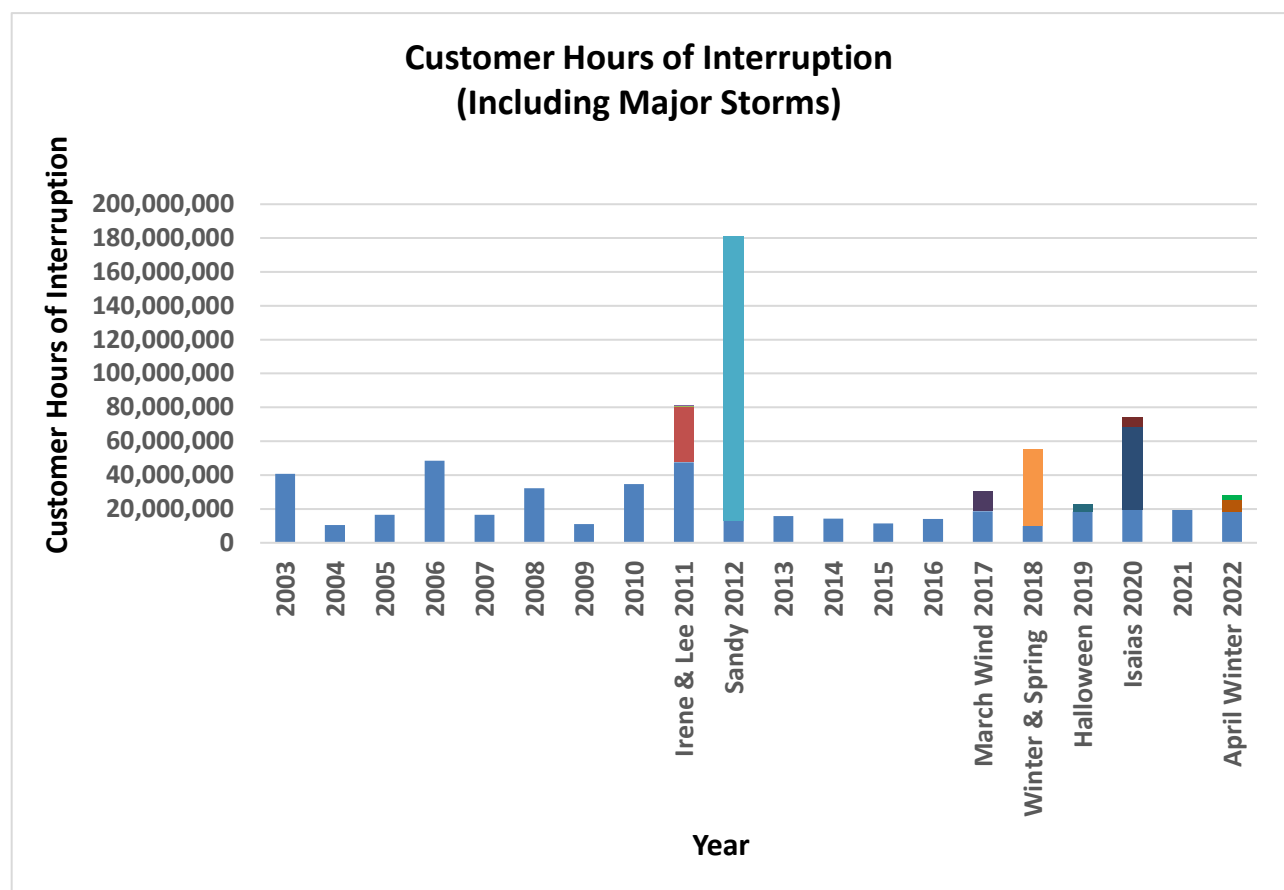


Figure 3: Customer Hours of Interruption (Including Major Storms)

The most significant storm event in 2022 occurred in April when a late season winter storm tracked up the East Coast and severely impacted parts of the Capital, Central New York, Mohawk Valley, North Country, and Southern Tier Regions. Beginning the evening of April 18, rain, turning into heavy wet snow, moved across the

area. Significant precipitation, with snowfall totaling up to 15 inches near the Adirondacks and other higher elevations within New York State, led to widespread power outages across a large span of central New York State. The National Weather Service issued winter storm warnings for 17 counties and winter weather advisories for an additional 13 counties. Large portions of National Grid's and NYSEG's service territories were impacted, with both companies sustaining over 200,000 customer outages each.

The second most significant storm occurred over the Christmas holiday weekend from December 23 to December 25, as a historic blizzard and lake effect snowstorm impacted large portions of the Western New York and Finger Lakes regions. This event spanned nearly five days, with the greatest impact in the city of Buffalo, affecting both National Grid's Frontier and NYSEG's Lancaster operating divisions. In total, approximately 110,000 customers lost service. Although initial blizzard conditions began on December 23, heavy lake effect snow continued through until December 27. Record setting snowfall amounts of approximately two feet, and maximum high wind gusts of 80 miles per hour led to extended power outages in the region.

The third most significant major storm event occurred during the first week of February when a winter storm tracked through the Southern Tier and into the Mid-Hudson and Mohawk Valley regions. The National Weather Service issued winter storm warnings and advisories for much of Western and Central New York. The storm had the greatest impact in Central Hudson's Kingston operating division, with approximately 79,000 customers interrupted. Combined, these three impactful storms were responsible for approximately 45 percent of the customers affected and seventy percent of the customer hours excluded as part of all major storm exclusions in 2022.

CON EDISON

Table 1: Con Edison's Historic Performance Excluding Major Storms

Performance Metric	2018	2019	2020	2021	2022	Current Target	Five-Year Average
Network Systems							
Frequency (SAIFI)	0.0174	0.0223	0.0858	0.0170	0.0174	0.0176 ¹³	0.0320
Duration (CAIDI)	6.31	6.72	1.79	6.57	6.23	6.89	5.52
Radial System							
Frequency (SAIFI)	0.398	0.526	0.469	0.489	0.467	0.495	0.470
Duration (CAIDI)	1.99	2.73	2.02	1.93	1.86	2.04	2.11

Note: Data presented in red represents a failure to meet the target for a given year.

Con Edison serves approximately 3.5 million customers in New York City and Westchester County. Con Edison supplies electricity to 2.6 million customers by a network system, while it supplies the remaining 900,000 customers by a radial system. The network system is mostly underground wires housed in conduits, whereas the radial system is the typical overhead configuration. The two systems are subject to different reliability metric targets specific to each configuration.

Network Systems Performance

On its network system, Con Edison achieved its system-wide frequency target of 0.0176 and its duration performance target of 6.89 hours with performance values of 0.0174 and 6.23 hours, respectively. Con Edison's network frequency performance of 0.0174 is a two percent decrease from its 2021 performance but is better than the five-year average. The Company's network duration performance of 6.23 in 2022 is a five percent improvement over its 2021 performance but is worse than the five-year average. When compared to their 2021 performance, network systems in Brooklyn and Manhattan

¹³ In addition to the previously defined Major Storms, Con Edison's current RPM, established in the rate order in Case 19-E-0065, snow/ice events affecting the underground system, and customers impacted by a storm who are served via overhead lines connected to the underground network system are also excluded from network system reliability target calculations. Appendix values do not reflect these exclusions.

experienced less frequent outages, while duration improved in Brooklyn, Queens, and Manhattan.

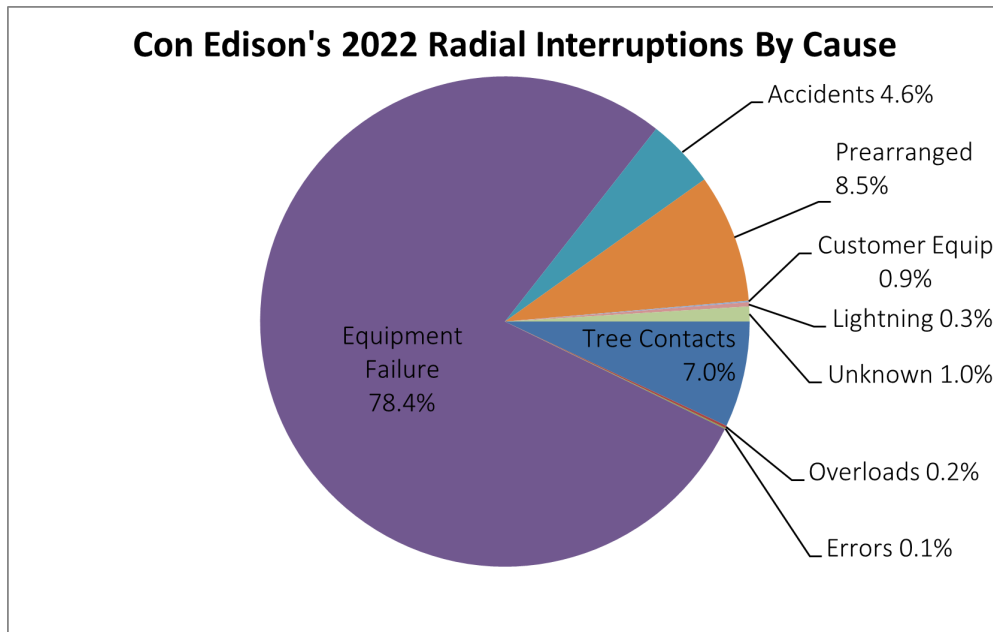
The largest contributing events that impacted Con Edison's network performance continue to be underground equipment failures. During the summer months, heat, humidity, and increased demand for electricity to power air conditioners can cause underground cables to overheat and lead to outages. From July 12 to July 14, Con Edison's service territory experienced one of the first significant heat waves of the season, with several days in a row with a maximum temperature of 90 degrees Fahrenheit (F) and high humidity levels resulting in heat indices of 95 degrees F. During this heat event, 1,530 customers were interrupted with an average duration of 6.46 hours. A week later, from July 19 to July 24, high heat and humidity returned, with temperatures in the mid-90s. Outages affected 2,194 customers and the average outage duration was 5.66 hours. Before and during heat waves, Con Edison takes steps such as managing voltage levels, cooling transformers, and deploying generators to prevent outages and reduce their duration and scope. Con Edison also invested in equipment such as cables, transformers, network protectors, and substation equipment in preparation for the summer of 2022 and improve reliability.

Con Edison works to improve the reliability of its underground distribution systems through its network relief and reliability programs. Con Edison implements these programs system-wide to reduce both network outage frequency and duration. To specifically address interruptions due to equipment failure, the company has several capital programs focused on replacing poorly performing equipment, such as vintage cable types, outdated splices and joints, and obsolete underground switches. For example, the company's Paper-Insulated Lead Covered (PILC) Program replaces PILC cable with solid dielectric cable to reduce the individual and network feeder failure rates. This program was started in 1986 in response to the higher feeder failure rates of PILC cable and their associated stop joints. In 2022, Con Edison removed 414 sections of the PILC cable from their primary network feeders.

Radial Performance

On its radial system, Con Edison achieved its system-wide frequency target of 0.495 and its duration performance target of 2.04 hours with performance values of 0.0.467 and 1.86 hours, respectively. The 2022 radial outage frequency performance improved by approximately five percent compared to 2021 and is less than the five-year average. The 2022 radial outage duration performance improved by approximately four minutes compared to 2021 and is approximately fifteen minutes better than the five-year average. When compared to 2021 performance, radial systems in Queens and Westchester had less frequent outages, while outage duration improved in Westchester and Brooklyn radial systems.

As shown in Figure 4 below, the leading causes of interruptions to Con Edison's radial system continue to be company equipment failures, followed by prearranged outages and tree contacts. The number of interruptions due to equipment failure and prearranged outages increased when compared to 2021 values, while the number of interruptions due to tree contacts decreased. One such equipment failure incident that greatly impacted both the company's outage frequency and duration performance occurred on August 29 in Staten Island when, due to a disturbance on the electric transmission system, two area substations in Staten Island loss supply. This outage event impacted nearly 18,000 customers for an average duration of approximately 26 minutes.



**Figure 4: Con Edison 2022 Radial Interruptions by Cause
(Excluding Major Storms)**

In order to improve the reliability and resiliency of its radial system, Con Edison manages numerous ongoing capital and preventive maintenance programs. One such capital program Con Edison uses to reduce equipment failure interruptions is its Aerial Cable Replacement program. This program aims to reduce the number of interruptions due to equipment failure by targeting the replacement of overhead cable manufactured by Okonite in the early to mid-1970's, a vintage type of cable that has been found to have high-failure rates throughout Con Edison's radial system. In 2022, Con Edison replaced 2,330 feet of aerial cable under this program in order to increase overall system performance and reliability. To address radial interruptions due to tree contacts, Con Edison executes a vegetation management program for its distribution system. As part of the company's Tree Trimming maintenance activity, Con Edison requires tree branches to be trimmed to 10 feet on either side and below overhead primary wires and 15 feet above primary wires. Con Edison utilizes a two-year tree trimming cycle for its 33 kV and 27 kV primary wires, and a three-year cycle for its 4 kV and 13kV primary wires. In 2022 Con Edison trimmed a total of 1,437 linear miles of distribution circuitry.

NATIONAL GRID

Table 2: National Grid Historic Performance Excluding Major Storms

Performance Metric	2018	2019	2020	2021	2022	Current Target	Five-Year Average
Frequency (SAIFI)	1.01	1.02	1.04	1.06	1.06	1.08	1.04
Duration (CAIDI)	2.04	2.03	2.03	1.89	1.95	2.10	1.99

National Grid serves approximately 1.68 million customers across upstate New York. The company's territory includes metropolitan areas, such as Albany, Buffalo, and Syracuse, as well as many rural areas in northern New York and the Adirondacks. For 2022, the company met both the frequency and duration reliability targets. The 2022 frequency level of 1.06 is the same as last year, two percent below the target, and three percent higher than the five-year average. The 2022 duration performance of 1.95 hours is better than the target of 2.10 hours and the five-year average of 1.99 hours. However, this is 3.6 minutes longer than last year's duration of 1.89.

As shown in Figure 5, four causes were responsible for approximately 92 percent of interruptions on National Grid's electric system. Tree contacts caused 31 percent of interruptions, followed by equipment failures at approximately 28 percent, accidents at approximately 18 percent, and unknown at 15 percent. Customers experienced 912 fewer tree contact events in 2022 than in 2021. However, the number of customers affected by tree contacts increased slightly over last year.

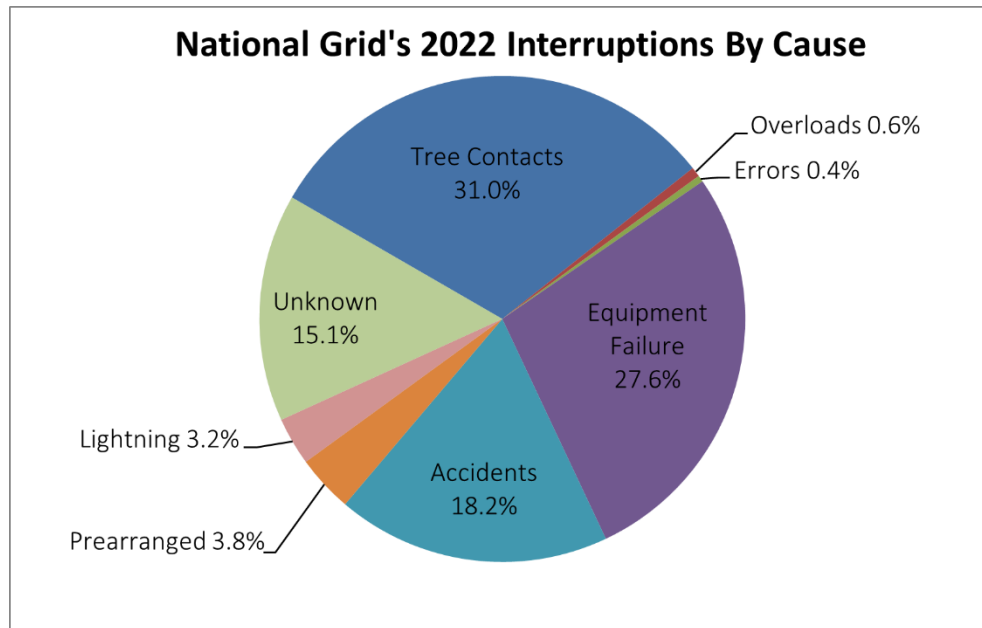


Figure 5: National Grid 2022 Interruptions by Cause (Excluding Major Storms)

National Grid uses six subcodes to further breakdown the cause of tree contact interruptions excluding major storms: tree fell, broken limb, growth, vines, Emerald Ash Borer (EAB) tree fell, and EAB broken limb. Within tree contact interruptions, tree fell accounted for nearly 69 percent of the customer interruptions in 2022, followed by broken limbs at 24 percent. The volume of tree fell, and broken limb interruptions demonstrates the importance of a robust hazard tree program. The small number of tree and vine growth interruptions indicate that the current pruning cycle and specifications are effective in minimizing interruptions related to vegetation growth. In addition to the subcodes, National Grid uses inspections, number of customers served, and circuit configuration to identify and prioritize feeders for the removal of hazards trees. To lessen the impact of Emerald Ash Borer, or EAB, infestation on the electric system, National Grid successfully implemented an Ash Tree Removal Program in 2017. National Grid expects to remove an additional 30,000 Ash trees throughout 2023 and 2024. In 2022, approximately 10 percent of all vegetation related outages were caused by Ash trees. The Ash Tree Removal Program also includes an outage follow-up process to monitor the number of interruptions caused by Ash trees. According to the company, this will aid in

distributing vegetation management resources appropriately if the interruptions decrease, remain stable, or if they begin to escalate due to further EAB infestation. This process will be especially important in future years as National Grid's system is also starting to experience the failure of White Pine, Sugar Maple and other tree species due to invasive fungi and insects that compromise tree health and structure.

Equipment failures accounted for approximately 28 percent of interruptions in 2022, an increase of approximately three percent. National Grid has several capital and maintenance programs in place to ensure it maintains and improves reliability on the electric system. Each year, National Grid selects several circuits from the worst performing circuit list for an Engineering Reliability Review (ERR). The ERR is an analysis of the circuit characteristics and performance. Examples of improvements identified and implemented through these efforts include adding fault indicators, feeder ties, capacitor banks, switches, reclosers, load balancing, and reconductoring. National Grid also uses its Inspection and Maintenance Program to identify and correct equipment issues.

In 2021, National Grid began deploying on its distribution system a Fault Location, Isolation, and Service Restoration (FLISR) system. According to the company, the FLISR system will be able to actively restore unaffected areas of the system during a contingency event and have full SCADA capability for monitoring and control of its distribution assets.¹⁴ National Grid plans to install 10 active distribution FLISR schemes by mid-2023. National Grid's ultimate goal is to have approximately 60 percent of its New York customers served by circuits equipped with FLISR.

Through its TripSaver Installation Program, National Grid began installing cutout mounted reclosers system-wide in 2019. The goal of this program is to reduce the number of sustained interruptions related to temporary faults on fused portions of the distribution system. These devices will limit the exposure to transient faults, such as tree

¹⁴ Supervisory Control and Data Acquisition, or simply SCADA, is one of the solutions available for data acquisition, monitor and control systems covering large geographical areas. It refers to the combination of data acquisition and telemetry.

and animal contacts, lightning and unknown causes that have led to customer outages. Locations targeted for TripSaver installations include circuits with high customer counts and historical reliability issues.

Accidents accounted for 18 percent of interruptions in 2022, an increase of approximately three percent over 2021. Motor Vehicle Accidents continue to be one of the largest causes of interruptions. National Grid investigates all poles that are involved in vehicle accidents to identify hazardous locations and relocates poles if necessary. Unknown causes were the fourth largest cause of interruptions in 2022 at 15 percent, the same as 2021 performance. Additional National Grid efforts to improve reliability include distribution patrols, maintenance programs, protection coordination studies, lightning protection, and tree trimming programs.

NYSEG

Table 3: NYSEG Historic Performance Excluding Major Storms

Performance Metric	2018	2019	2020	2021	2022	Current Target	Five-Year Average
Frequency (SAIFI)	1.19	1.35	1.36	1.46	1.45	1.20	1.36
Duration (CAIDI)	2.17	1.93	1.98	2.02	1.88	2.08	1.99

Note: Data presented in red represents a failure to meet the target for a given year.

NYSEG serves approximately 905,000 electric customers across upstate New York and some areas of Westchester and Putnam Counties. The company serves a primarily rural area that covers approximately 40 percent of New York, including 42 counties and 149 small cities and villages. Cities served by NYSEG include Auburn, Binghamton, Geneva, Hornell, Ithaca, Lockport, Mechanicville, Oneonta, and Plattsburgh.

NYSEG failed to meet its frequency target for a fourth straight year, with an outage frequency of 1.45 in 2022, its second worst performance out of the most recent five years. Tree contacts continued to be the single largest contributor to system interruptions, accounting for 42 percent of the interruptions in 2022 and affecting approximately 500,000 customers. As part of the 2020 NYSEG Rate Order, the Commission authorized an

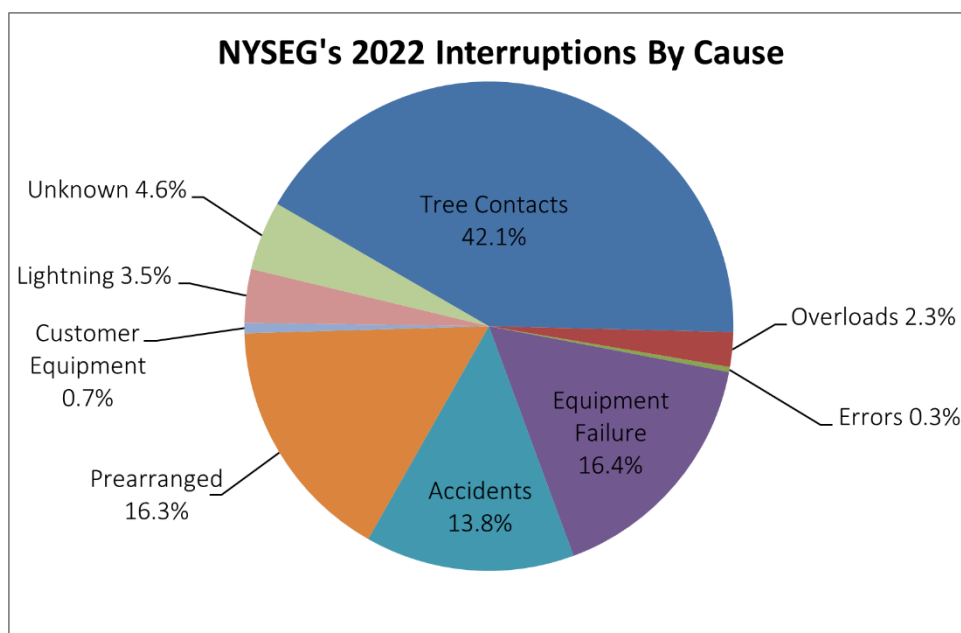
expanded distribution vegetation management budget for NYSEG to fund additional trimming.¹⁵ The 2020 NYSEG Rate Order also authorized a Reclamation Program focused on trimming areas that NYSEG had not trimmed in over ten years and a Danger Tree Program to address danger trees outside of NYSEG's distribution right-of-way.

Despite this additional funding, tree related outages did not decrease in 2022 as they did in 2021. Although NYSEG experienced a decrease in the number of outages due to trees inside the right-of-way from 2020 to 2022, there was an increase in the number of outages due to trees from outside the right-of-way over that same period. NYSEG appropriately spent the allotted Danger Tree budget over the most recent three-year rate period, but the Company's reliability performance over that same time indicates that there is need for improvement associated with this program. NYSEG must better develop its approach to identify and remove hazard trees from outside the right of way in order to deliver improved reliability benefits to customers. Therefore, the Director of the Office of Resilience and Emergency Preparedness will contact NYSEG to request a report detailing proposed improvements and revisions to improve reliability by addressing these trees outside the right of way and danger trees by August 31, 2023.

As shown in Figure 6, tree contacts, equipment failure, and prearranged outages were the predominant causes of interruptions throughout NYSEG's service territory. These three causes were responsible for approximately 74 percent of all interruptions. Tree contacts decreased by seven percent, equipment failures decreased by nearly two percent and accidents decreased by less than one percent. Prearranged interruptions increased by 12 percent. NYSEG attributes the increase in the number of pre-arranged outages to required Make Ready work needed to support the New York State "Broadband for All" initiative and other programs. However, National Grid, Central Hudson and Orange & Rockland are also experiencing additional Make Ready work and have seen comparable or reduced amounts of pre-arranged outages from 2021 to 2022, while still providing reliable service. Therefore, Staff recommends that NYSEG discuss

¹⁵ Case 19-E-0378, supra, p. 82.

with the other New York State utilities the practices they use, specifically with regard to the steps taken in coordinating with third-party pole-attachment owners and their contractors to most appropriately conduct these outages to mitigate the impact their activities may be having on reliability.



**Figure 6: NYSEG 2022 Interruptions by Cause
(Excluding Major Storms)**

NYSEG states that it has employed a series of programs and procedures to reduce the number of interruptions and improve its frequency performance. NYSEG also states that it updated its distribution design standards and specifications to expand the use of tree wire and increase the strength requirements for poles.¹⁶ Furthermore, NYSEG claims it has also focused on multiple programs to help replace and correct equipment issues before the equipment fails. In addition to its routine Distribution and Transmission Line Inspection programs, designed to identify and reduce the number of deficiencies

¹⁶ Tree wire eliminates temporary faults due to minor tree contact.

throughout the service territory as mandated by the Commission¹⁷, NYSEG has a dedicated program to address Level II deficiencies identified as part of its routine inspection processes. The Distribution Line Deficiency Program, started in 2019, was designed to most efficiently use internal and contractor workforces to address a growing inventory and backlog of Level II deficiencies on a circuit-by-circuit basis. In 2021, NYSEG completed repairs on all unrepaired Level II deficiencies discovered between 2012 and 2019, eliminating their backlog. NYSEG was also able to complete repairs on all Level II deficiencies identified in 2022. NYSEG expects this program to continue through 2023 with the goal to have all future Level II deficiencies repaired within one year of notification to prevent a future backlog.

In response to a series of significant storms in 2018, NYSEG announced that a comprehensive resiliency plan would be developed as part of an overall approach to storm hardening its electric distribution system. According to NYSEG, its Distribution Resiliency Plan (Resiliency Plan) focuses on three components to limit outages resulting from severe storms. First, NYSEG plans to harden infrastructure through more robust construction practices and materials that will increase the ability of the electric system to withstand severe storms. Second, aggressive removal of hazard trees will also increase the ability of the electric system to withstand severe storms. Third, NYSEG implements changes to circuit design to allow it to isolate outages and restore power more quickly through actions such as adding or upgrading lines, increasing feeder ties, and increasing automation.¹⁸ Automation includes the installation of SCADA switches, tie switches, and reclosers to segment long circuits into multiple sections. Sections can be isolated automatically to limit the number of customers that lose power during an event. Sectionalizing also reduces the time required to restore power to those customers who do lose power. Since 2021, NYSEG completed work on its 40 worst performing circuits,

¹⁷ Case 04-M-0159, Proceeding on Motion of the Commission to Examine the Safety of Consolidated Edison Company of New York, Inc.'s Electric Transmission and Distribution Systems, Order Instituting Safety Standards, (issued January 5, 2005)(2005 Electric Safety Order).

¹⁸ Feeder ties connect two or more circuits together to ensure service is maintained in the event of an outage.

including installing over 110 miles of tree wire, 86 SCADA switches, 59 tripsavers, 57 SCADA reclosers, four generators, three step-up transformers, and two load transfer projects. As part of its current Resiliency Plan, NYSEG has engineered, designed, and scheduled for construction approximately 15 circuit resiliency projects for 2023. These projects include wire upgrades, conversions, reconductors and smart switch installations. Circuit resiliency projects are determined using a comprehensive identification and ranking system of NYSEG's circuits within its service territory. Targeted resiliency projects take time to complete and improvements in reliability may not be immediately evident.

NYSEG's duration performance improved from 2021 and was NYSEG's best performance in the last five years. NYSEG successfully met its duration metric in 2022 by implementing a company-wide program consisting of process improvements designed to reduce overall duration times. In addition, NYSEG is relocating distribution lines from remote locations and building tie lines and looped feeders where appropriate. Looped feeders consist of at least two feeders interconnected through normally open tie points. Under normal conditions, electricity does not flow through the tie point. Switching during outages allows power to flow on looped feeders from alternate paths, which reduces the impacts of a fault by isolating it. These improvements are all part of the company's increased efforts to strengthen its system both at substations and on distribution lines.

RG&E

Table 4: RG&E Historic Performance Excluding Major Storms

Performance Metric	2018	2019	2020	2021	2022	Current Target	Five-Year Average
Frequency (SAIFI)	0.75	0.72	0.88	1.13	0.83	0.90	0.86
Duration (CAIDI)	1.79	1.84	1.78	1.81	1.64	1.90	1.77

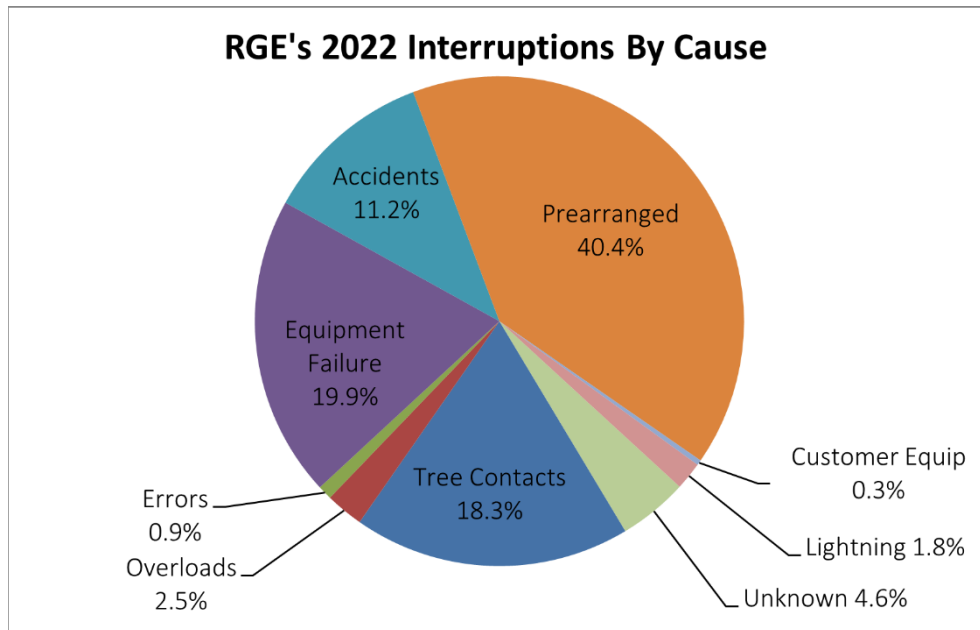
Note: Data presented in red represents a failure to meet the target for a given year.

RG&E serves approximately 384,000 electric customers over its franchise area, located in and around Rochester. The company's territory is comprised of four

divisions: Canandaigua, Genesee Valley, Lakeshore, and Rochester, with the Rochester Division accounting for approximately 80 percent of its customer base.

For the past 20 years, RG&E has consistently maintained high levels of electric service reliability for both outage frequency and duration. After failing to meet its frequency target in 2021, RG&E has returned to its pre-2021 levels. Both the Rochester and Canandaigua Divisions met their frequency and duration performance targets, while the Genesee Valley and Lakeshore Divisions exceeded both frequency and duration targets.

In 2022, the three major causes for interruptions throughout RG&E's service territory were prearranged interruptions, tree contacts, and equipment failures, as shown in Figure 7. Last year, prearranged interruptions were the leading cause of interruptions. Prearranged interruptions jumped in 2021, mostly due to the broadband expansion work in the area that included pole replacements. This work has continued in 2022. The frequency of prearranged outages dropped approximately 53 percent over 2021 while the duration rose by approximately 66 minutes. Customers were notified before the prearranged outages so they could plan accordingly. As Staff recommended regarding NYSEG's performance regarding these prearranged interruptions, RG&E should meet with other New York State utilities that are also experiencing additional Make Ready work and discuss best practices for when conducting broadband work outages to mitigate the impact this activity has on reliability performance.



**Figure 7: RG&E 2022 Interruptions by Cause
(Excluding Major Storms)**

RG&E and NYSEG are both subsidiaries of Avangrid Inc. and as a result they implement many of the same programs and procedures to reduce the number of interruptions, reduce overall duration times, and improve reliability. Examples include vegetation management, Circuit Breaker Replacement Program, Distribution and Transmission Line Inspection Programs, Distribution Line Deficiency Program, and Distribution Circuit Resiliency and Hardening Program.

Since 2019, RG&E has completed resiliency projects on 20 circuits. Since 2021, RG&E completed work on 31 worst performing circuits including installing approximately 26 miles of tree wire, 2.5 miles of underground conductor, more than 160 SCADA switches, 50 TripSavers, 20 SCADA reclosers, and five load transfer projects. Circuit resiliency projects are determined by a comprehensive identification and ranking system of all RG&E's circuits within their service territory. RG&E engineered, designed, and scheduled construction for 15 resiliency projects in 2023. The company's service division with the most notable amount of resiliency project work is the Rochester - Central division, subject to nine of the eleven circuit resiliency projects completed in 2022.

Programs that reduce the number of interruptions on the underground system include the Underground Manhole and Handhole Inspection Program, Network Maintenance Program, and Distribution Padmount Transformer Maintenance Program. RG&E also uses a technology called cable injection to proactively reduce Underground Residential Distribution (URD) outages. This technology focuses on the injection of a silicon-based fluid into the strands of aging cables. The injection modifies the properties of the insulation and extends the cable's life. RG&E also plans to introduce a new URD program, which will provide a long-term solution to evaluate, prioritize, and rebuild underground cables.

On its overhead system, RG&E relies on its Distribution Line Inspection program data and other inspection programs to find, prioritize and repair equipment issues. To address tree related interruptions, RG&E completed nearly 1,150 miles and 1,117 miles of tree trimming in 2021 and 2022 respectively. RG&E plans to continue scheduled trimming in 2023 plus additional hot spot trimming on circuits not addressed by the current maintenance plan. Additionally, RG&E has prioritized worst performing circuits, or those that impact reliability to a greater degree. The company's planned work in the Rochester Division continues to focus on back lot circuits, which are circuits that are located behind customer property or in other hard-to-reach areas.

CENTRAL HUDSON

Table 5: Central Hudson Historic Performance Excluding Major Storms

Performance Metric	2018	2019	2020	2021	2022	Current Target	Five-Year Average
Frequency (SAIFI)	1.49	1.25	1.29	1.42	1.27	1.32	1.34
Duration (CAIDI)	2.04	2.38	2.37	2.67	2.25	2.50	2.34

Note: Data presented in red represents a failure to meet the target for a given year.

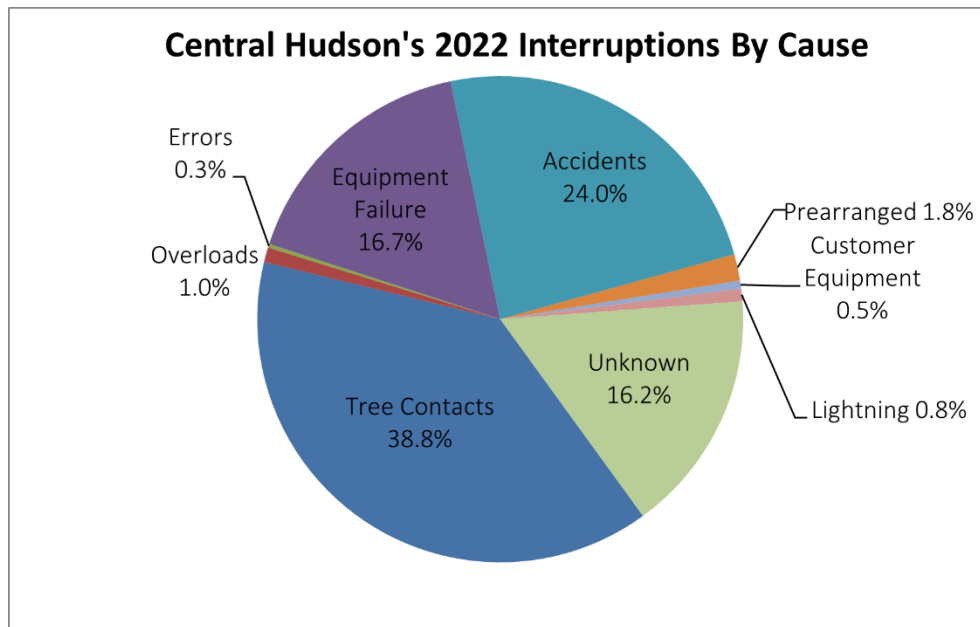
Central Hudson serves approximately 312,000 customers in parts of eight counties of New York's Mid-Hudson River Valley. Counties served by Central Hudson include Albany, Columbia, Dutchess, Greene, Orange, Putnam, Sullivan, and Ulster.

Central Hudson's five operating divisions are Catskill, Fishkill, Kingston, Newburgh, and Poughkeepsie. About 70 percent of Central Hudson's territory is within the Kingston, Newburgh, and Poughkeepsie Divisions.

Central Hudson met both its outage frequency and duration targets for 2022. Both Central Hudson's 2022 outage frequency and duration are down to levels comparable to before 2021. Tree contacts were the number one frequency driver for 2022, compromising 47 percent of all causes.¹⁹ This was an 18 percent improvement over last year's performance and in line with the five-year average. Central Hudson's frequency performance of 1.28 is better than both the established target of 1.32 and the five-year average of 1.35. The Company's duration performance of 2.25 hours was 15 minutes shorter than the established target of 2.50 hours and 5.4 minutes shorter than the five-year average of 2.34 hours. As shown in Figure 8, four outage causes were responsible for approximately 96 percent of the interruptions in 2022: tree contacts; accidents or events not under the utility control (accidents); unknown; and equipment failures.

Tree contact interruptions declined this year when compared to 2021, however, it was the second highest recorded in the last five years. Central Hudson reports the largest contributor to tree contact interruptions were caused by limbs and trees from outside the clearance zone. According to the company, it addresses tree contact issues through its routine distribution trimming and their targeted hazard tree removal program, started in 2018. This program prioritizes hazard tree removal for three-phase circuits with the greatest potential to have a positive impact on system frequency performance. In 2022, the company also performed mid-cycle "hot spot" trimming based on engineering analysis and field condition on circuits out of Woodstock Substation in the Company's Kingston operating division. This has led to an improved frequency performance in the Kingston district, where tree contact customer outages were down 19 percent compared to the five-year historical average. Accordingly, the company states it focuses on vegetation management to improve its outage frequency and duration performance.

¹⁹ SAIFI and CAIDI contribution by cause code can be found on pages 3-4 of Central Hudson's 2022 Electric Reliability Report.



**Figure 8: Central Hudson 2022 Interruptions by Cause
(Excluding Major Storms)**

In addition, in 2022 Central Hudson also modified its routine trimming schedule by shifting resources to the areas with the most impactful effects on outage frequency. For example, circuits out of the Kerhonkson and Highland Substations, planned for trimming in 2023, were trimmed in 2022, due to their poor reliability performance, while circuits due to be trimmed in 2023, but that demonstrated better reliability will now be trimmed in 2023.

Interruptions caused by accidents or events not under the utilities control is the second highest frequency driver, 13 percent higher than 2021 performance and two percent higher than the five-year average. This increase was primarily caused by animal contacts in substations. The Company has been and will continue to install animal guards and closely follow ongoing research led by the Electric Power Research Institute (EPRI) on the effectiveness of various animal guards.

Interruptions as a result of equipment failures were the third highest frequency performance driver in 2022, an increase of approximately seven percent from the 2021 level but three percent lower than the five-year average. The biggest driver for

equipment failure was conductor, or cable, failure. These failures are typically attributed to asset age and loss of strand connections, which cause gradual overheating during normal loading cycles. In order to decrease the number of interruptions due to equipment failures, Central Hudson states that it has expanded its infrared thermal inspection program to include winter peaking heavily loaded circuits and spur lines with large customer counts, and heavily loaded single-phase and two-phase lines. The infrared thermal inspection program identifies equipment such as conductors, cutouts, connectors, and arrestors with poor connections that can lead to thermal failure. Central Hudson expects these measures to reduce equipment failure frequency by allowing it to proactively identify and replace/repair equipment that is near failure.

Central Hudson's duration performance of 2.25 hours is down 10 percent compared to 2021 and is four percent below the five-year average. Outages due to tree contacts were the number one duration driver during the year, contributing 57 percent of the total. This increase due to tree contacts was primarily driven by trees and limbs from outside the clearance zone. According to Central Hudson, in 2022, it assembled a cross-functional team comprising Engineering, Electric T&D, Operations Services and System Operations groups with the hope of improving both its frequency and duration performance. In addition, Central Hudson indicates it uses distribution switching whenever feasible to restore as many customers as possible before completing repairs.

In 2023, Central Hudson plans to improve on their outage duration performance with the continued roll-out of its Distribution Automation program. As part of this project, Central Hudson installs electronic devices and network communication systems that form the backbone of its Fault Locating, Isolation and Service Restoration, or FLISR, schemes. During 2022, Central Hudson installed 12 sets of electronic reclosers as part of this program. In 2023, Central Hudson plans to perform nine projects under their Distribution Automation program in order to improve reliability throughout its service territory. These projects include the installation of additional FLISR devices, like smart switches, and reconductoring or storm hardening circuits to increase circuit flexibility.

ORANGE & ROCKLAND

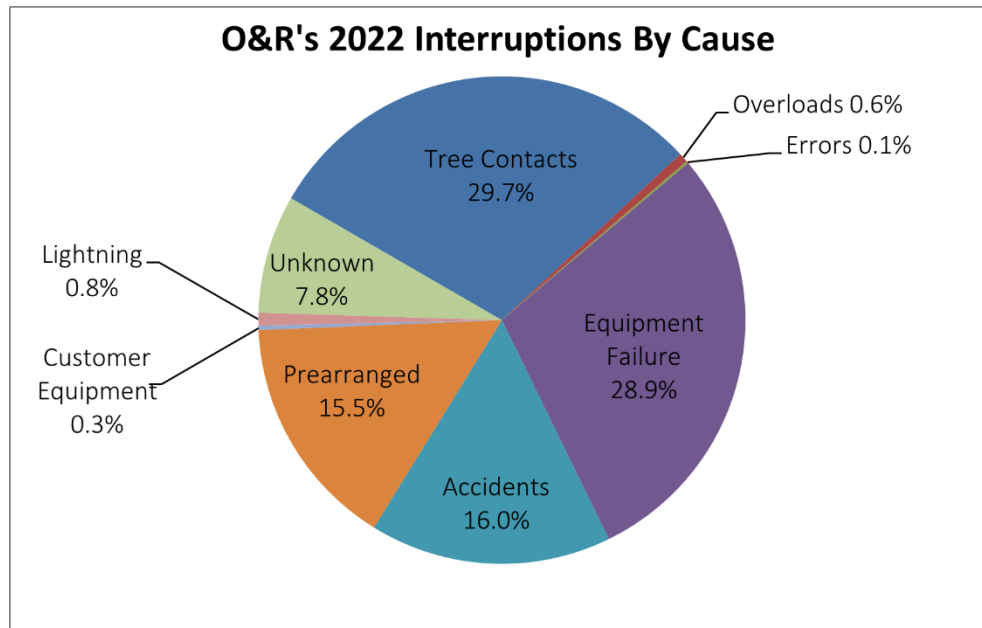
Table 6: Orange & Rockland Historic Performance Excluding Major Storms

Performance Metric	2018	2019	2020	2021	2022	Current Target	Five-Year Average
Frequency (SAIFI)	1.12	1.09	0.96	1.14	0.93	1.20	1.05
Duration (CAIDI)	1.78	1.71	1.67	1.57	1.76	1.85	1.70

Orange & Rockland serves approximately 236,000 customers in Orange, Rockland, and Sullivan Counties in southern New York. For operational purposes, the Company separates these areas into three divisions: Central, Eastern, and Western. Orange & Rockland met both its established outage frequency and duration targets for 2022. The Company's outage frequency performance of 0.93 was lower than the established target of 1.20 and lower than the five-year average of 1.05. The Company's outage duration performance of 1.76 hours was better than both the established target of 1.85 hours and worse than the five-year average of 1.70 hours. Overall, the Company's performances have continuously been below the target levels – a good indication that the company's reliability initiatives continue to have a positive impact on reliability performance.

As shown in Figure 9, equipment failures and tree contacts continue to be the major cause of interruptions for Orange & Rockland. In 2022, these two categories accounted for approximately 59 percent of all interruptions and 62 percent of all customers affected.²⁰ Prearranged, or scheduled, outages were the third leading cause of interruptions.

²⁰ These percentages were based on Figure 2.7 - Outage Statistics by Cause, page 32, Orange & Rockland Service Reliability Filing For 2022 System Performance.



**Figure 9: Orange & Rockland 2022 Interruptions by Cause
(Excluding Major Storms)**

When compared to 2021 values, interruptions caused by equipment failures decreased slightly in 2022. For the company's overhead system, secondary connector and splice failures, as well as transformer failures, were the most common causes of equipment failure interruptions. For the underground system, the equipment failure rate was again above historical levels, primarily due to cable and splice failures. According to the company, to address increasing underground cable and splice failures, Orange & Rockland has an Underground Cable Rehab and Rebuild Program. This program increases customer reliability by proactively targeting cable sections for either replacement or rehabilitation. For older cable sections that have not had multiple failures, Orange & Rockland chooses to rehabilitate them by injecting a patented silicone-based fluid into the cable to fill possible voids and restore the dielectric properties of the deteriorated cable. For cable sections that have had multiple cable failures, the section of cable is replaced with new insulated cable. The company uses a priority ranking list developed using outage statistics to identify which cable sections should be rebuilt or rehabilitated. Padmount transformer failures were also

above the five-year average for the fourth straight year.²¹ This is primarily due to a large number of leaking padmount transformers that Orange & Rockland had previously identified during inspections in 2018 and 2019. The company states that it has and will continue to replace these transformers as operational conditions permit.

Orange & Rockland's service reliability programs are designed to reduce interruption frequency and duration through inspection and maintenance of equipment installed on the transmission and distribution system. These programs define activities that will most cost effectively meet customer reliability needs. Reliability programs establish inspection intervals, minimum component testing, minimum performance requirements, and maintenance procedures to be performed during each inspection. Orange & Rockland monitors the performance of all equipment types to detect any potential failures, identify trends, and take mitigation measures as necessary.

Orange & Rockland states that it reduces the number of outages experienced by the typical customer through its continued grid modernization and distribution automation efforts. These programs include three main categories: circuit optimization; field automation; and centralized automation control. Circuit optimization involves the use of smart capacitors and power quality sensors to make the distribution system more efficient. Examples of field automation devices include motorized air brake (MOAB) switches, reclosers, and automatic switches that are used in auto-loop designs. These loop distribution systems are designed to circle through the service area and several substations before terminating at the point of origin. The strategic placement of switches permits the company to supply power to customers from either direction. If one power source fails, switches are opened or closed to obtain an alternate power source. Centralized automation control facilitates the monitoring and control of automatic devices from the company's distribution control center. In 2022, Orange & Rockland installed two auto-loops, 117 MOABs, 12 reclosers, and six smart capacitors.

²¹ Padmount transformers are used with underground electric power distribution lines at service drops, to step down the primary voltage on the line to the lower secondary voltage supplied to utility customers.

PSEG-LI

Table 7: PSEG-LI Historic Performance Excluding Major Storms

Performance Metric	2018	2019	2020	2021	2022	Current Target	Five-Year Average
Frequency (SAIFI)	0.86	0.67	0.80	0.68	0.68	0.76	0.74
Duration (CAIDI)	1.27	1.27	1.38	1.34	1.37	None	1.33

PSEG-LI serves approximately 1,144,000 customers on Long Island. Its territory includes Nassau County, Suffolk County, and the Rockaway Peninsula in Queens County. PSEG-LI began operating and maintaining the electric system for the Long Island Power Authority (LIPA) on January 1, 2014. To assist the Department in its statewide analysis, PSEG-LI supplies annual interruption data. Unlike the other utilities, the Commission does not issue rate orders for PSEG-LI. Therefore, performance metrics were set as part of PSEG-LI's Amended Operating Service Agreement (OSA) with the LIPA.²²

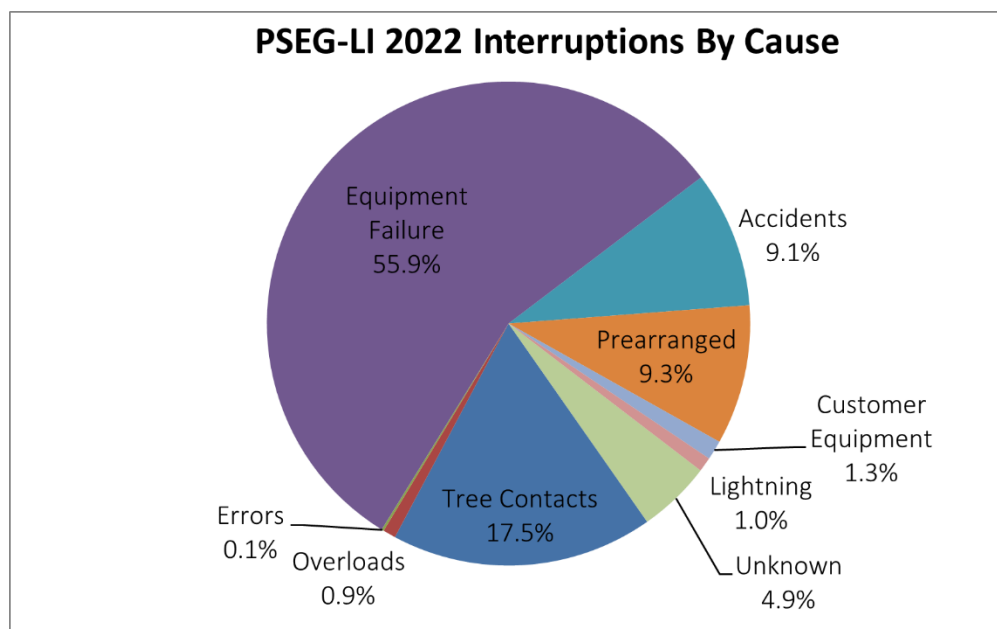
PSEG-LI met its outage frequency OSA target in 2022. The outage frequency level of 0.68 was lower than the OSA target of 0.76 and below the five-year average of 0.74. For 2022 PSEG-LI did not use CAIDI as its OSA target for duration as part of its performance metrics and used alternative metrics to measure duration performance.²³ In 2022, the outage duration of 1.37 hours falls short of the five-year average performance by 2.4 minutes.

In 2022, PSEG-LI used the System Average Interruption Duration Index, or SAIDI, as its OSA target for outage duration performance. This is calculated by dividing the total number of customer minutes of interruption by the total number of customers served. PSEG-LI met its OSA target of 59 minutes for SAIDI with a performance of 56 minutes.

²² Second Amended and Restated Operations Services Agreement between Long Island Lighting Company d/b/a LIPA and PSEG Long Island LLC, Dated as of April 1, 2022. (<https://www.lipower.org/wp-content/uploads/2022/04/2nd-AR-OSA-in-effect-on-4-1-2022.pdf>).

²³ PSEGLI 2022 Performance Metrics Package. <https://www.lipower.org/wp-content/uploads/2022/11/PSEGLI-2022-Performance-Metrics.pdf>

As shown in Figure 10, equipment failures, tree contacts, and accidents continue to be the major causes of unplanned interruptions in PSEG-LI's service territory. These three categories account for approximately 83 percent of all interruptions.



**Figure 10: PSEG-LI 2022 Interruptions by Cause
(Excluding Major Storms)**

Interruptions caused by equipment failures decreased by 2.5 percent in 2022. The top three equipment failure drivers are downed primary wires, underground primary cable failures, and broken primary line taps. According to the company, every year, as part of PSEG-LI's Circuit Improvement Program, hundreds of miles of distribution lines are inspected, prioritized, and repaired to ensure the equipment is in good working order. PSEG-LI's Circuit Improvement Program will focus on 104 separate branchlines during 2023 to improve reliability. As part of the Circuit Improvement Program, PSEG-LI will take various actions to improve reliability including identification and remediation of substandard equipment conditions, installation of series fuses and fault indicators, and review of branch lines serving approximately 150 or more customers. Additionally, PSEG-LI continues to improve on the reliability of smaller areas with abnormally high outage frequency with their Multiple Interruption Program. Projects included as part of this

program include equipment replacements, such as replacing open-wire secondary with triplex secondary, the identification of hazardous vegetation, and may also include a reconfiguration of the circuit for improved reliability.

The percent of interruptions due to tree contacts decreased by approximately one percent when compared to 2021. Tree related outages remained the second leading cause of interruptions in 2022. PSEG-LI continues to address tree contact issues through its Enhanced Vegetation Management Program, which considers historical reliability performance and field observations when prioritizing circuits. The Enhanced Vegetation Management Program is having a positive effect on reliability for those circuits that are being trimmed under the increased distribution line clearance specification. Specifically for the circuits trimmed with a full year of history of being trimmed to the new specification there has been a 30 percent reduction, on average, in customers interrupted (including major storms) after the first year. Interruptions caused by accidents decreased by approximately one percent when compared to 2021 and were the third leading cause of unplanned interruptions in 2022.

In 2022, PSEG-LI completed 319 circuits included as part of its ongoing PowerOn Program. The PowerOn Program consists of storm hardening improvements and targets the entire mainline for circuits with poor performance.²⁴ Storm-hardening improvements include stronger poles that are capable of withstanding storm force winds. In addition, to help wires deflect falling branches and limbs, stronger cross arms and conductors with more insulation will be installed on poles. The program also allows for the installation of up to 1,300 automatic switches and the upgrade or replacement of deteriorated equipment as necessary.

²⁴ The PowerOn Program is an extension of the completed Federal Emergency Management Agency (FEMA) overhead mainline hardening program that was completed in 2020.

APPENDIX

The 2022 Interruption Report

**Office of Resilience and Emergency Preparedness
June 2023**

ATTACHMENT
Definitions and Explanations of Terms Used in
The Statewide Electric Service Interruption Report

Interruption is the loss of service for five minutes or more.

Customer Hours is the time a customer is without electric service.

Customers Affected is the number of customers without electric service.

Customer Served is the number of customers as of the last day of the current year. For example, for the calendar year of 2018, customers served is the number of customers as of December 31, 2018. For indices using customers served, the previous year is used.

Frequency (SAIFI) measures the average number of interruptions experienced by customers served by the utility. It is the customers affected divided by the customers served at the end of the previous year.

Duration (CAIDI) measures the average time that an affected customer is out of electric service. It is the customer hours divided by the customers affected.

Availability (SAIDI) is the average amount of time a customer is out of service during a year. It is the customer hours divided by the number of customers served at the end of the year. Mathematically it is SAIFI multiplied by CAIDI.

Interruptions per 1,000 Customers Served is the number of interruptions divided by the number of customers served at the end of the previous year, divided by 1,000.

Major Storm is defined as any storm which causes service interruptions of at least ten percent of customers in an operating area, or if the interruptions last for 24 hours or more.

Operating Area is the geographical subdivision of each electric utilities franchise territory. These are also called regions, divisions, or districts.

Most of the data is presented in two ways, with major storms included and major storms excluded. Major storms tend to distort a utility's performance trend. Tables and graphs that exclude major storms illustrate interruptions that are under a utility's control. It portrays a utility's system facilities under normal conditions, although this can be misleading because interruptions during "normal" bad weather are included and it is difficult to analyze from year to year.

The first two tables show frequency and duration indices for the last five years for each utility and Statewide with and without Con Edison data. Much of the Con Edison distribution system consists of a secondary network. In a secondary network, a customer is fed multiple supplies, significantly reducing the probability of interruptions.

**COMPARISON OF SERVICE RELIABILITY INDICES
(EXCLUDING MAJOR STORMS)**

	2018	2019	2020	2021	2022	5 YR AVG
CHGE						
FREQUENCY	1.49	1.25	1.29	1.42	1.27	1.34
DURATION	2.04	2.38	2.37	2.67	2.25	2.34
CONED						
FREQUENCY	0.12	0.18	0.19	0.15	0.14	0.15
DURATION	2.75	3.33	2.75	2.99	2.58	2.88
PSEG-LI *						
FREQUENCY	0.86	0.67	0.80	0.68	0.68	0.74
DURATION	1.27	1.27	1.38	1.34	1.37	1.33
NAT GRID						
FREQUENCY	1.01	1.02	1.04	1.06	1.06	1.04
DURATION	2.04	2.03	2.03	1.89	1.95	1.99
NYSEG						
FREQUENCY	1.19	1.35	1.36	1.46	1.45	1.36
DURATION	2.17	1.93	1.98	2.02	1.88	1.99
O&R						
FREQUENCY	1.12	1.09	0.96	1.14	0.93	1.05
DURATION	1.78	1.71	1.67	1.57	1.76	1.70
RG&E						
FREQUENCY	0.75	0.72	0.88	1.13	0.83	0.86
DURATION	1.79	1.84	1.78	1.81	1.64	1.77
STATEWIDE (WITHOUT CONED)						
FREQUENCY	1.02	0.99	1.04	1.08	1.03	1.03
DURATION	1.88	1.88	1.89	1.88	1.83	1.87
STATEWIDE (WITH CONED)						
FREQUENCY	0.63	0.64	0.67	0.68	0.64	0.65
DURATION	1.96	2.05	1.99	1.99	1.90	1.98

**COMPARISON OF SERVICE RELIABILITY INDICES
(INCLUDING MAJOR STORMS)**

	2018	2019	2020	2021	2022	5 YR AVG
CHGE						
FREQUENCY						
DURATION	2.58	1.54	2.15	1.81	1.87	1.99
	8.14	3.15	7.15	3.44	6.29	5.63
CONED						
FREQUENCY	0.20	0.20	0.32	0.16	0.14	0.20
DURATION	17.01	3.51	18.83	3.70	2.65	9.14
PSEG-LI *						
FREQUENCY	1.13	0.98	1.43	0.73	0.72	1.00
DURATION	2.24	2.91	12.22	1.54	1.44	4.07
NAT GRID						
FREQUENCY	1.52	1.49	1.50	1.31	1.49	1.46
DURATION	4.34	3.64	5.06	2.82	3.98	3.97
NYSEG						
FREQUENCY	2.29	1.90	2.07	2.16	2.28	2.14
DURATION	9.18	3.13	5.41	2.81	4.91	5.09
O&R						
FREQUENCY	1.73	1.37	1.89	1.28	1.00	1.45
DURATION	7.78	2.49	10.47	1.77	1.86	4.87
RG&E						
FREQUENCY	0.99	0.92	1.05	1.37	1.18	1.10
DURATION	3.64	2.43	1.99	3.40	2.76	2.85
STATEWIDE (WITHOUT CONED)						
FREQUENCY	1.61	1.39	1.62	1.37	1.43	1.48
DURATION	5.87	3.22	7.03	2.71	4.00	4.56
STATEWIDE (WITH CONED)						
FREQUENCY	1.00	0.88	1.05	0.85	0.87	0.93
DURATION	6.81	3.25	8.58	2.79	3.90	5.06

STATEWIDE (WITHOUT CON ED)

Excluding Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	61,441	57,657	62,595	62,839	66,845	62,275
Number of Customer-Hours	8,838,401	8,560,007	9,094,328	9,410,601	8,811,149	8,942,897
Number of Customers Affected	4,689,214	4,565,064	4,816,965	4,999,962	4,808,092	4,775,859
Number of Customers Served	4,577,274	4,595,216	4,618,770	4,647,421	4,661,199	4,619,976
Average Duration Per Customer Affected (CAIDI)	1.88	1.88	1.89	1.88	1.83	1.87
Average Duration Per Customers Served	1.95	1.87	1.98	2.04	1.90	1.95
Interruptions Per 1000 Customers Served	13.52	12.60	13.62	13.61	14.38	13.55
Number of Customers Affected Per Customer Served (SAIFI)	1.02	0.99	1.04	1.08	1.03	1.03

STATEWIDE (WITH CON ED)

Excluding Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	78,098	73,929	76,677	78,461	82,288	77,891
Number of Customer-Hours	9,983,360	10,625,692	10,932,269	10,948,854	10,075,244	10,513,084
Number of Customers Affected	5,105,730	5,185,626	5,486,038	5,515,006	5,298,241	5,318,128
Number of Customers Served	8,042,233	8,100,203	8,154,220	8,146,146	8,224,654	8,133,491
Average Duration Per Customer Affected (CAIDI)	1.96	2.05	1.99	1.99	1.90	1.98
Average Duration Per Customers Served	1.25	1.32	1.35	1.34	1.24	1.30
Interruptions Per 1000 Customers Served	9.79	9.19	9.47	9.62	10.10	9.63
Number of Customers Affected Per Customer Served (SAIFI)	0.63	0.64	0.67	0.68	0.64	0.65

STATEWIDE (WITHOUT CON ED)

Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	89,665	77,483	92,523	74,176	82,748	83,319
Number of Customer-Hours	43,261,363	20,598,728	52,580,256	17,229,084	26,625,493	32,058,985
Number of Customers Affected	7,373,442	6,398,344	7,474,848	6,368,352	6,661,387	6,855,275
Number of Customers Served	4,577,274	4,595,216	4,618,770	4,647,421	4,661,199	4,619,976
Average Duration Per Customer Affected (CAIDI)	5.87	3.22	7.03	2.71	4.00	4.56
Average Duration Per Customers Served	9.52	4.50	11.44	3.73	5.73	6.98
Interruptions Per 1000 Customers Served	19.74	16.93	20.13	16.06	17.81	18.13
Number of Customers Affected Per Customer Served (SAIFI)	1.61	1.39	1.62	1.37	1.43	1.48

STATEWIDE (WITH CON ED)

Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	113,241	94,714	113,885	91,010	98,751	102,320
Number of Customer-Hours	54,866,948	23,018,645	73,733,264	19,351,098	27,980,280	39,790,047
Number of Customers Affected	8,055,529	7,087,711	8,597,929	6,941,133	7,173,472	7,571,155
Number of Customers Served	8,042,233	8,100,203	8,154,220	8,146,146	8,224,654	8,133,491
Average Duration Per Customer Affected (CAIDI)	6.81	3.25	8.58	2.79	3.90	5.06
Average Duration Per Customers Served	6.88	2.86	9.10	2.37	3.43	4.93
Interruptions Per 1000 Customers Served	14.19	11.78	14.06	11.16	12.12	12.66
Number of Customers Affected Per Customer Served (SAIFI)	1.00	0.88	1.05	0.85	0.87	0.93

CENTRAL HUDSON

Excluding Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	8,011	7,316	7,738	7,525	7,574	7,633
Number of Customer-Hours	926,783	908,953	946,420	1,181,259	900,449	972,773
Number of Customers Affected	454,343	382,350	399,149	442,323	399,975	415,628
Number of Customers Served	304,382	307,024	309,262	311,785	313,732	309,237
Average Duration Per Customer Affected (CAIDI)	2.04	2.38	2.37	2.67	2.25	2.34
Average Duration Per Customers Served	3.07	2.99	3.08	3.82	2.89	3.17
Interruptions Per 1000 Customers Served	26.51	24.04	25.20	24.33	24.29	24.87
Number of Customers Affected Per Customer Served (SAIFI)	1.49	1.25	1.29	1.42	1.27	1.34

CENTRAL HUDSON

Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	11,334	8,517	10,616	8,925	9,668	9,812
Number of Customer-Hours	6,380,295	1,490,509	4,756,359	1,939,104	3,683,676	3,649,989
Number of Customers Affected	783,881	473,130	664,830	564,376	585,260	614,295
Number of Customers Served	304,382	307,024	309,262	311,785	313,732	309,237
Average Duration Per Customer Affected (CAIDI)	8.14	3.15	7.15	3.44	6.29	5.63
Average Duration Per Customers Served	21.11	4.90	15.49	6.27	11.81	11.92
Interruptions Per 1000 Customers Served	37.51	27.98	34.58	28.86	31.01	31.99
Number of Customers Affected Per Customer Served (SAIFI)	2.58	1.54	2.15	1.81	1.87	1.99

CON ED (SYSTEM)

Excluding Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	16,657	16,272	14,082	15,622	15,443	15,615
Number of Customer-Hours	1,144,959	2,065,685	1,837,941	1,538,254	1,264,095	1,570,187
Number of Customers Affected	416,516	620,562	669,073	515,044	490,149	542,269
Number of Customers Served	3,464,959	3,504,987	3,535,450	3,498,725	3,563,455	3,513,515
Average Duration Per Customer Affected (CAIDI)	2.75	3.33	2.75	2.99	2.58	2.88
Average Duration Per Customers Served	0.33	0.60	0.52	0.44	0.36	0.45
Interruptions Per 1000 Customers Served	4.85	4.70	4.02	4.42	4.41	4.48
Number of Customers Affected Per Customer Served (SAIFI)	0.12	0.18	0.19	0.15	0.14	0.15

CON ED (SYSTEM)

Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	23,576	17,231	21,362	16,834	16,003	19,001
Number of Customer-Hours	11,605,586	2,419,917	21,153,009	2,122,014	1,354,787	7,731,062
Number of Customers Affected	682,087	689,367	1,123,081	572,781	512,085	715,880
Number of Customers Served	3,464,959	3,504,987	3,535,450	3,498,725	3,563,455	3,513,515
Average Duration Per Customer Affected (CAIDI)	17.01	3.51	18.83	3.70	2.65	9.14
Average Duration Per Customers Served	3.38	0.70	6.04	0.60	0.39	2.22
Interruptions Per 1000 Customers Served	6.86	4.97	6.09	4.76	4.57	5.45
Number of Customers Affected Per Customer Served (SAIFI)	0.20	0.20	0.32	0.16	0.14	0.20

CON ED (NETWORK)

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	9,187	8,648	6,987	8,632	7,934	8,278
Number of Customer-Hours	434,540	765,764	973,079	685,954	472,142	666,296
Number of Customers Affected	59,620	144,678	241,562	72,670	64,155	116,537
Number of Customers Served	2,568,843	2,600,719	2,623,892	2,593,235	2,650,502	2,607,438
Average Duration Per Customer Affected (CAIDI)	7.29	5.29	4.03	9.44	7.36	6.68
Average Duration Per Customers Served	0.17	0.30	0.37	0.26	0.18	0.26
Interruptions Per 1000 Customers Served	3.61	3.37	2.69	3.29	3.06	3.20
Number of Customers Affected Per Customer Served (SAIFI)	0.023	0.056	0.092	0.028	0.024	0.045

CON ED (RADIAL)

Excluding Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	7,470	7,624	7,095	6,990	7,934	7,423
Number of Customer-Hours	710,418	1,299,921	864,862	852,299	791,953	903,891
Number of Customers Affected	356,896	475,884	427,511	442,374	425,994	425,732
Number of Customers Served	896,116	904,268	911,558	905,490	912,953	906,077
Average Duration Per Customer Affected (CAIDI)	1.99	2.73	2.02	1.93	1.86	2.11
Average Duration Per Customers Served	0.80	1.45	0.96	0.93	0.87	1.00
Interruptions Per 1000 Customers Served	8.40	8.51	7.85	7.67	8.76	8.24
Number of Customers Affected Per Customer Served (SAIFI)	0.398	0.526	0.469	0.489	0.467	0.470

CON ED (RADIAL)

Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	14,389	8,583	14,375	8,202	16,003	12,310
Number of Customer-Hours	11,171,045	1,654,153	20,179,929	1,436,059	882,645	7,064,766
Number of Customers Affected	622,467	544,689	881,519	500,111	447,930	599,343
Number of Customers Served	896,116	904,268	911,558	905,490	912,953	906,077
Average Duration Per Customer Affected (CAIDI)	17.95	3.04	22.89	2.87	1.97	9.74
Average Duration Per Customers Served	12.56	1.85	22.32	1.58	0.97	7.85
Interruptions Per 1000 Customers Served	16.18	9.58	15.90	9.00	17.67	13.66
Number of Customers Affected Per Customer Served (SAIFI)	0.695	0.602	0.967	0.552	0.491	0.661

PSEG-LI

Excluding Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	20,697	18,578	21,176	19,555	21,372	20,276
Number of Customer-Hours	1,223,074	966,360	1,246,625	1,037,492	1,067,733	1,108,257
Number of Customers Affected	963,985	760,091	901,830	773,082	779,221	835,642
Number of Customers Served	1,124,900	1,128,693	1,134,141	1,138,340	1,144,195	1,134,054
Average Duration Per Customer Affected (CAIDI)	1.27	1.27	1.38	1.34	1.37	1.33
Average Duration Per Customers Served	1.09	0.86	1.10	0.91	0.94	0.98
Interruptions Per 1000 Customers Served	18.45	16.52	18.76	17.24	18.77	17.95
Number of Customers Affected Per Customer Served (SAIFI)	0.86	0.67	0.80	0.68	0.68	0.74

PSEG-LI

Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	26,277	24,220	35,462	20,366	22,275	25,720
Number of Customer-Hours	2,847,012	3,204,176	19,756,921	1,276,823	1,190,274	5,655,041
Number of Customers Affected	1,271,447	1,102,036	1,616,774	827,804	827,533	1,129,119
Number of Customers Served	1,124,900	1,128,693	1,134,141	1,138,340	1,144,195	1,134,054
Average Duration Per Customer Affected (CAIDI)	2.24	2.91	12.22	1.54	1.44	4.07
Average Duration Per Customers Served	2.54	2.85	17.50	1.13	1.05	5.01
Interruptions Per 1000 Customers Served	23.42	21.53	31.42	17.96	19.57	22.78
Number of Customers Affected Per Customer Served (SAIFI)	1.13	0.98	1.43	0.73	0.72	1.00

NATIONAL GRID

Excluding Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	14,447	13,747	15,134	14,883	14,738	14,590
Number of Customer-Hours	3,408,167	3,426,393	3,512,446	3,334,033	3,478,746	3,431,957
Number of Customers Affected	1,670,265	1,692,764	1,732,491	1,767,661	1,781,841	1,729,004
Number of Customers Served	1,650,922	1,656,128	1,663,214	1,673,962	1,677,625	1,664,370
Average Duration Per Customer Affected (CAIDI)	2.04	2.03	2.03	1.89	1.95	1.99
Average Duration Per Customers Served	2.08	2.08	2.12	2.00	2.08	2.07
Interruptions Per 1000 Customers Served	8.83	8.33	9.14	8.95	8.80	8.81
Number of Customers Affected Per Customer Served (SAIFI)	1.01	1.02	1.04	1.06	1.06	1.04

NATIONAL GRID

Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	22,653	21,177	20,782	18,559	20,914	20,817
Number of Customer-Hours	10,882,228	8,946,922	12,629,772	6,177,279	9,920,022	9,711,245
Number of Customers Affected	2,510,027	2,459,557	2,494,794	2,190,203	2,493,613	2,429,639
Number of Customers Served	1,650,922	1,656,128	1,663,214	1,673,962	1,677,625	1,664,370
Average Duration Per Customer Affected (CAIDI)	4.34	3.64	5.06	2.82	3.98	3.97
Average Duration Per Customers Served	6.65	5.42	7.63	3.71	5.93	5.87
Interruptions Per 1000 Customers Served	13.85	12.83	12.55	11.16	12.49	12.58
Number of Customers Affected Per Customer Served (SAIFI)	1.52	1.49	1.50	1.31	1.49	1.46

NYSEG

Excluding Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	11,349	11,051	11,807	11,774	13,839	11,964
Number of Customer-Hours	2,310,303	2,329,587	2,419,098	2,658,719	2,458,728	2,435,287
Number of Customers Affected	1,063,122	1,207,533	1,224,028	1,317,127	1,310,034	1,224,369
Number of Customers Served	891,168	895,050	899,315	905,005	905,435	899,195
Average Duration Per Customer Affected (CAIDI)	2.17	1.93	1.98	2.02	1.88	1.99
Average Duration Per Customers Served	2.61	2.61	2.70	2.96	2.72	2.72
Interruptions Per 1000 Customers Served	12.84	12.40	13.19	13.09	15.29	13.36
Number of Customers Affected Per Customer Served (SAIFI)	1.19	1.35	1.36	1.46	1.45	1.36

NYSEG

Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	20,937	15,500	16,859	15,963	19,584	17,769
Number of Customer-Hours	18,716,707	5,323,921	10,051,986	5,509,346	10,137,576	9,947,907
Number of Customers Affected	2,038,575	1,699,146	1,859,509	1,958,103	2,064,781	1,924,023
Number of Customers Served	891,168	895,050	899,315	905,005	905,435	899,195
Average Duration Per Customer Affected (CAIDI)	9.18	3.13	5.41	2.81	4.91	5.09
Average Duration Per Customers Served	21.17	5.97	11.23	6.13	11.20	11.14
Interruptions Per 1000 Customers Served	23.68	17.39	18.84	17.75	21.64	19.86
Number of Customers Affected Per Customer Served (SAIFI)	2.29	1.90	2.07	2.16	2.28	2.14

O&R

Excluding Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	3,709	3,669	3,546	3,858	4,027	3,762
Number of Customer-Hours	455,696	424,497	371,083	418,697	384,873	412,925
Number of Customers Affected	255,101	248,317	222,505	267,493	219,180	242,640
Number of Customers Served	227,959	230,381	231,512	234,333	235,938	231,784
Average Duration Per Customer Affected (CAIDI)	1.78	1.71	1.67	1.57	1.76	1.70
Average Duration Per Customers Served	2.07	1.86	1.62	1.81	1.64	1.80
Interruptions Per 1000 Customers Served	16.53	16.09	15.47	16.66	17.18	16.39
Number of Customers Affected Per Customer Served (SAIFI)	1.12	1.09	0.96	1.14	0.93	1.05

O&R

Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	4,571	4,306	5,245	4,127	4,118	4,473
Number of Customer-Hours	3,069,852	783,968	4,585,941	529,830	438,501	1,881,618
Number of Customers Affected	394,557	314,613	437,942	299,986	235,364	336,492
Number of Customers Served	227,959	229,180	231,512	234,333	235,938	231,784
Average Duration Per Customer Affected (CAIDI)	7.78	2.49	10.47	1.77	1.86	4.87
Average Duration Per Customers Served	13.68	3.44	20.01	2.29	1.87	8.26
Interruptions Per 1000 Customers Served	20.37	18.89	22.89	17.83	17.57	19.51
Number of Customers Affected Per Customer Served (SAIFI)	1.73	1.37	1.89	1.28	1.00	1.45

RG&E

Excluding Major Storms

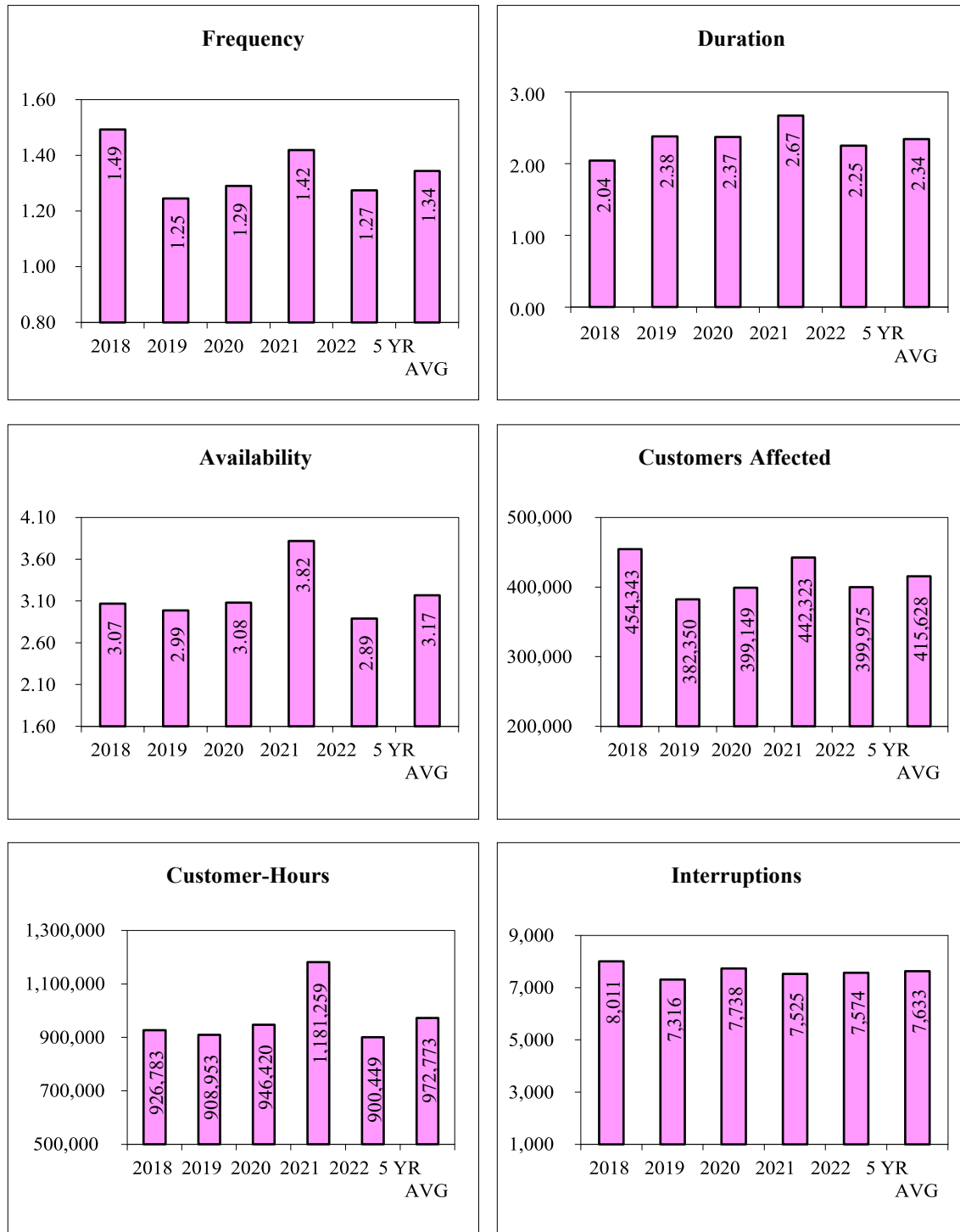
	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	3,228	3,296	3,194	5,244	5,295	4,051
Number of Customer-Hours	504,600	504,217	598,656	780,401	520,620	581,699
Number of Customers Affected	281,793	274,009	336,962	432,276	317,841	328,576
Number of Customers Served	377,943	379,141	381,326	383,996	384,274	381,336
Average Duration Per Customer Affected (CAIDI)	1.79	1.84	1.78	1.81	1.64	1.77
Average Duration Per Customers Served	1.35	1.33	1.58	2.05	1.36	1.53
Interruptions Per 1000 Customers Served	8.62	8.72	8.42	13.75	13.79	10.66
Number of Customers Affected Per Customer Served (SAIFI)	0.75	0.72	0.88	1.13	0.83	0.86

RG&E

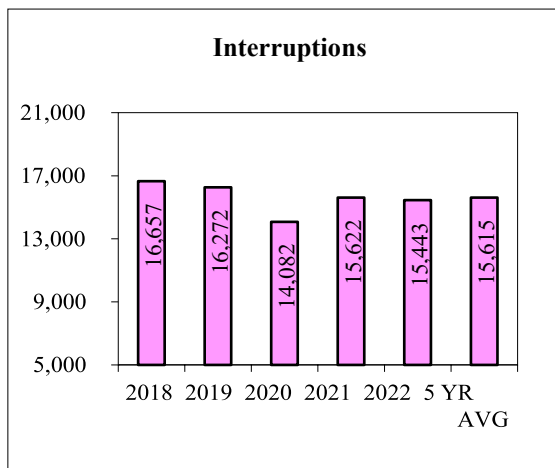
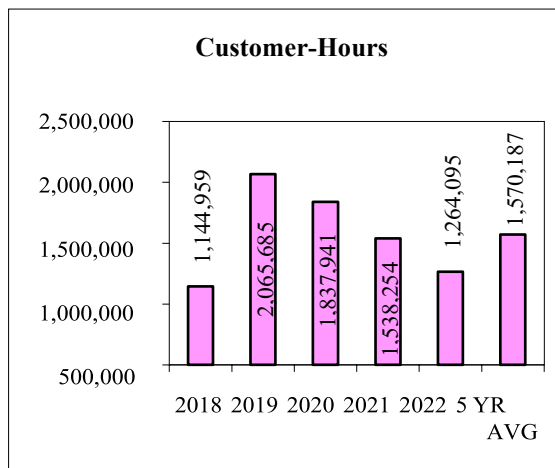
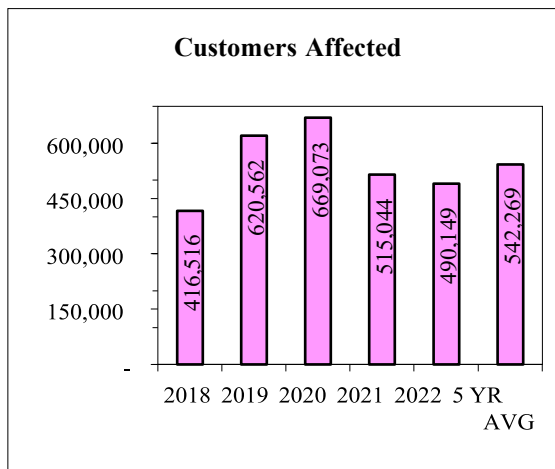
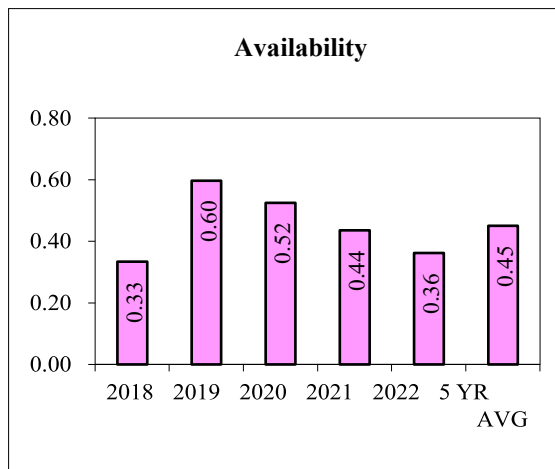
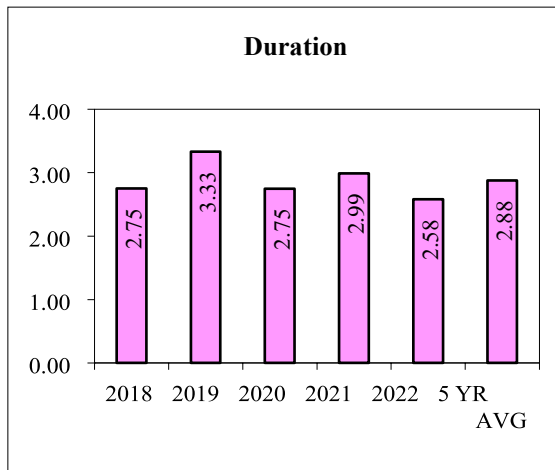
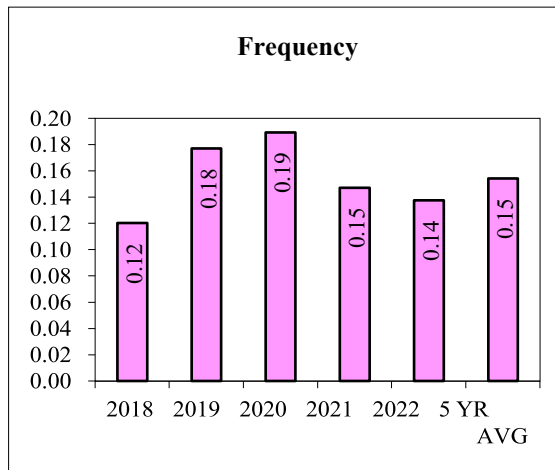
Including Major Storms

	2018	2019	2020	2021	2022	5 YR AVG
Number of Interruptions	3,893	3,763	3,559	6,236	6,189	4,728
Number of Customer-Hours	1,365,269	849,232	799,277	1,796,702	1,255,444	1,213,185
Number of Customers Affected	374,955	349,862	400,999	527,880	454,836	421,706
Number of Customers Served	377,943	379,141	381,326	383,996	384,274	381,336
Average Duration Per Customer Affected (CAIDI)	3.64	2.43	1.99	3.40	2.76	2.85
Average Duration Per Customers Served	3.64	2.25	2.11	4.71	3.27	3.20
Interruptions Per 1000 Customers Served	10.39	9.96	9.39	16.35	16.12	12.44
Number of Customers Affected Per Customer Served (SAIFI)	0.99	0.92	1.05	1.37	1.18	1.10

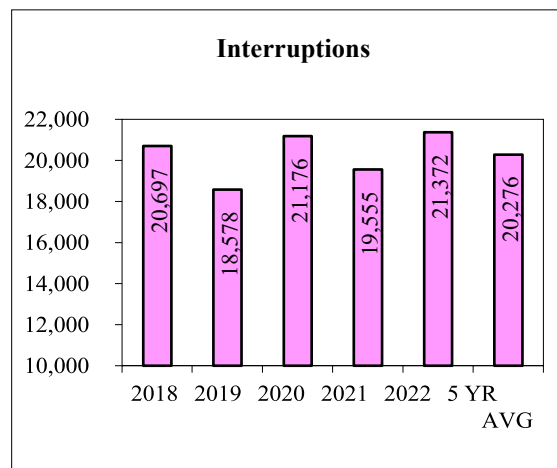
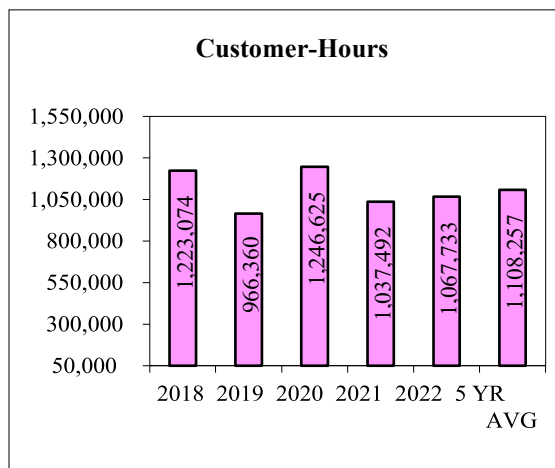
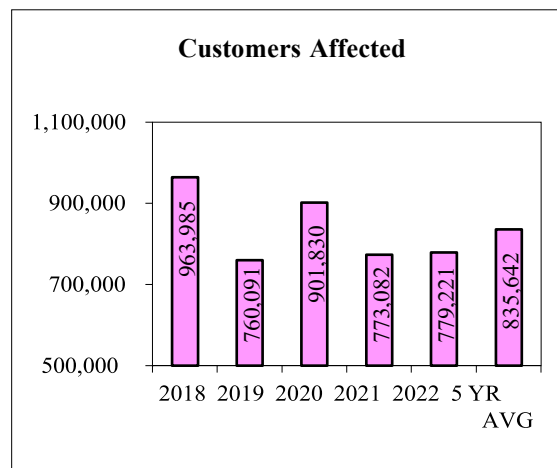
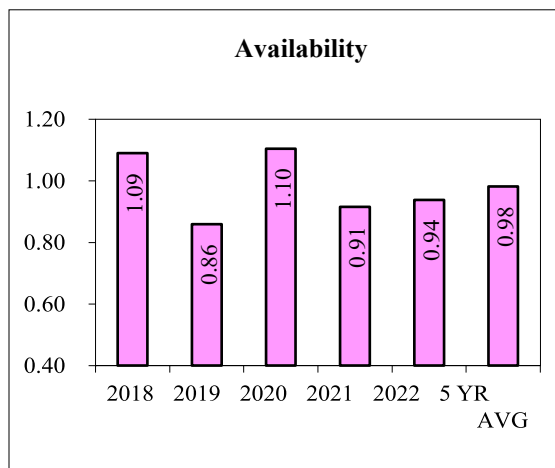
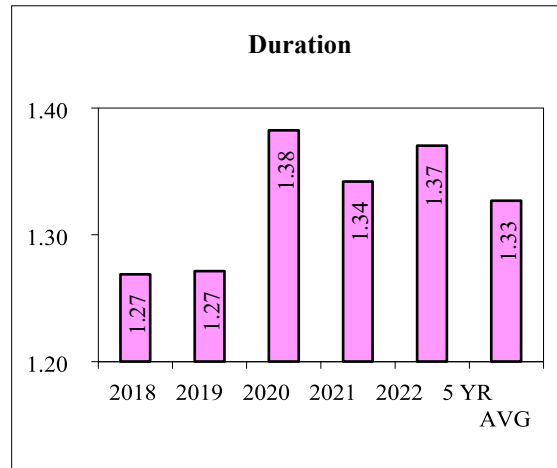
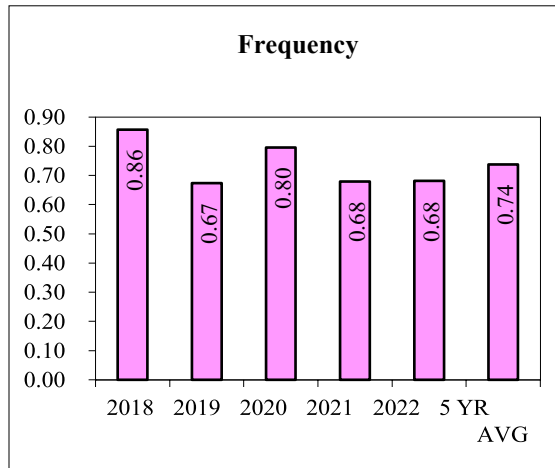
Central Hudson Gas and Electric (Excluding Major Storms)



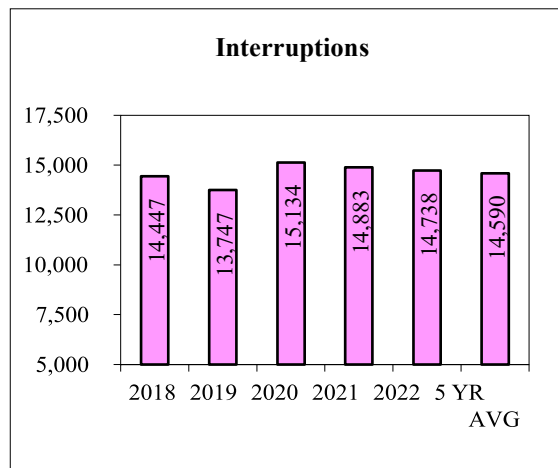
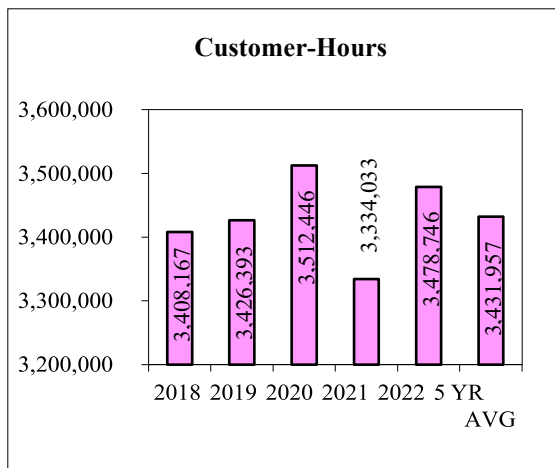
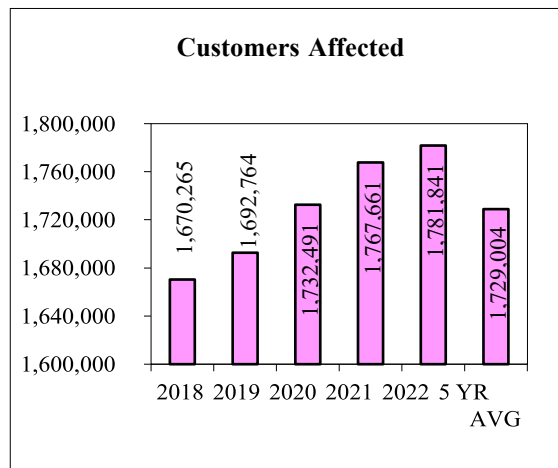
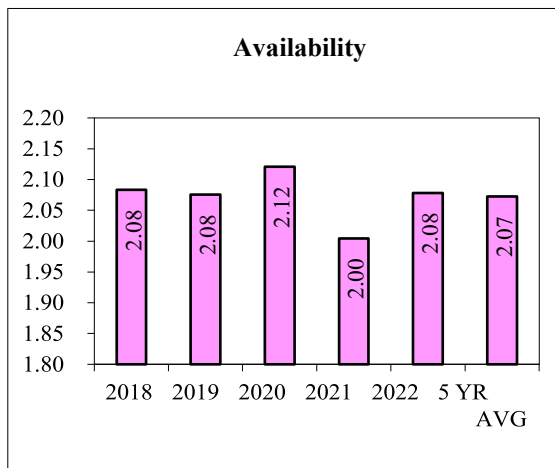
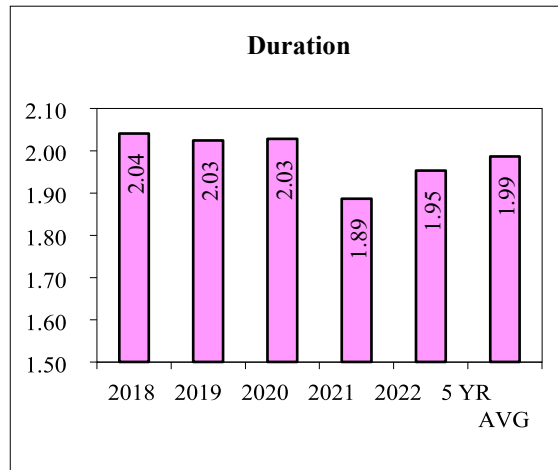
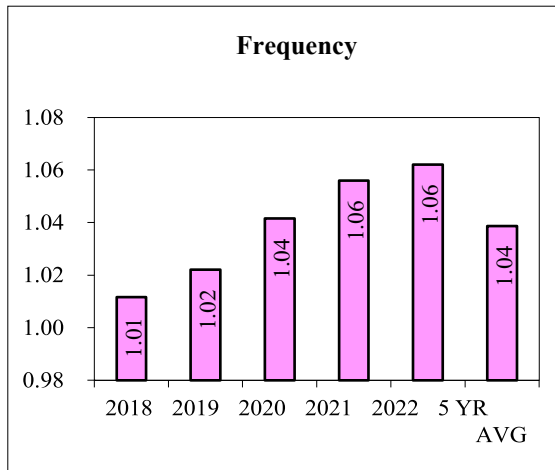
Consolidated Edison - System (Excluding Major Storms)



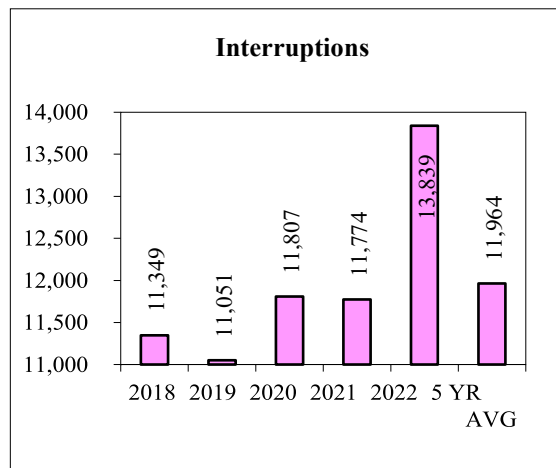
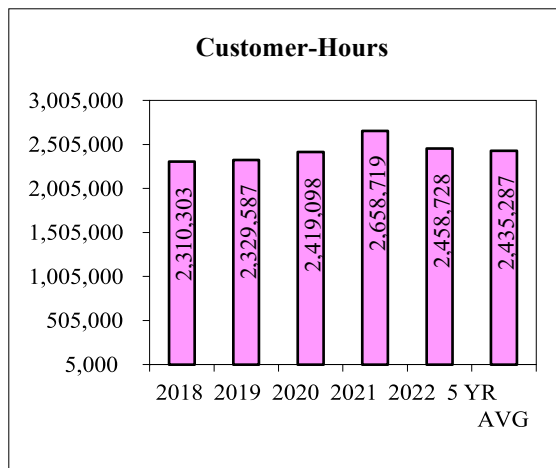
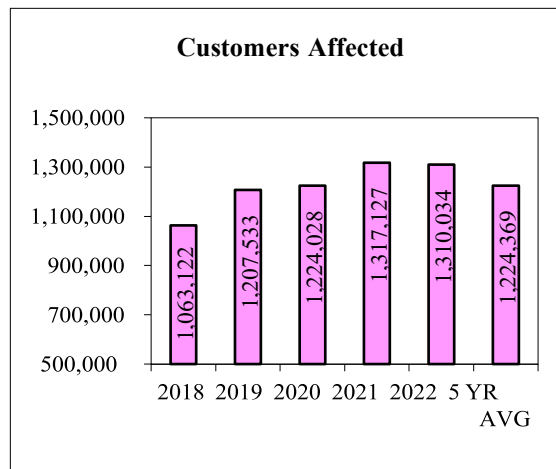
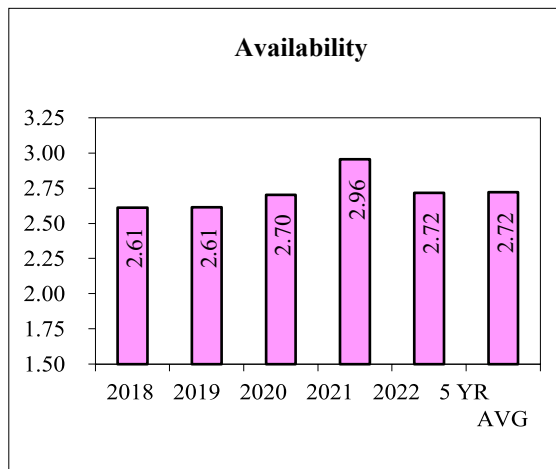
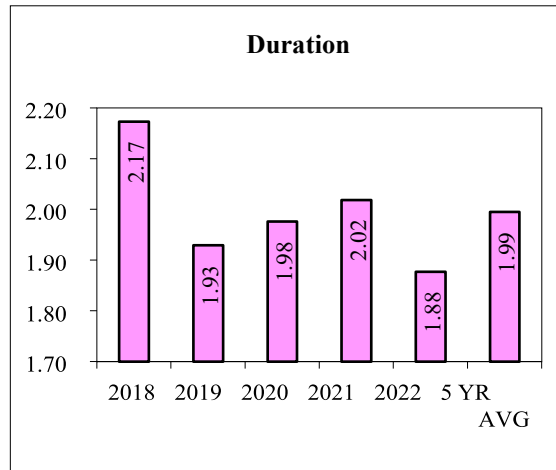
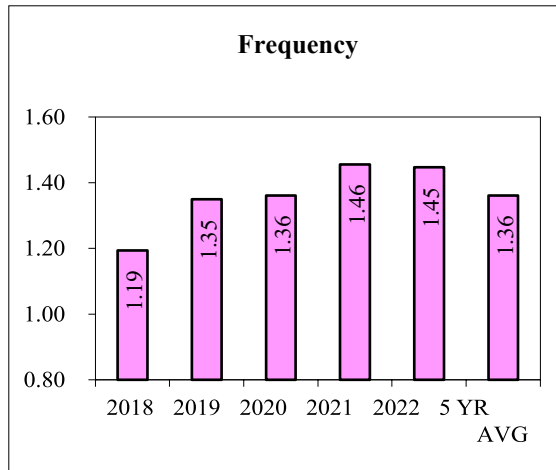
Long Island Power Authority (Excluding Major Storms)



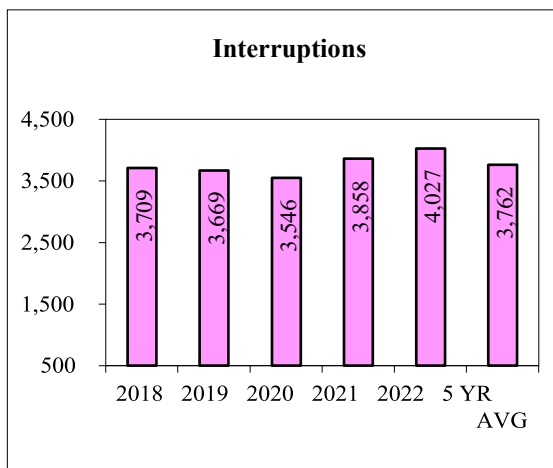
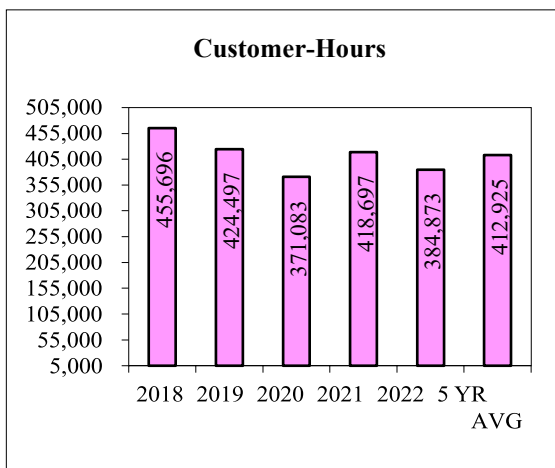
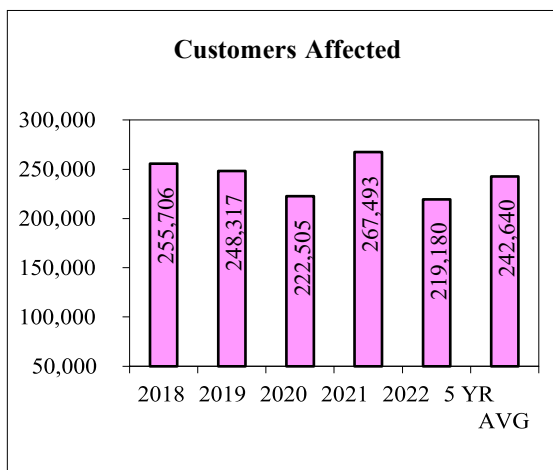
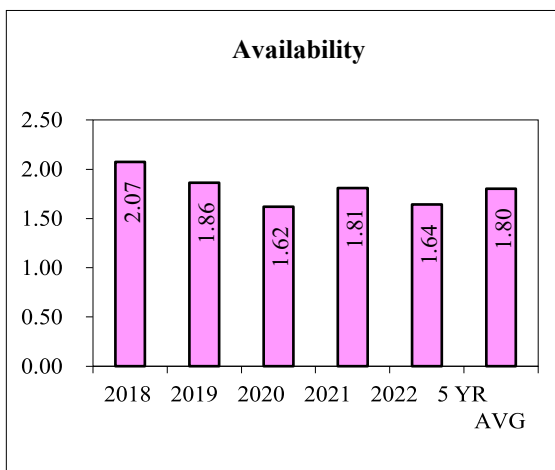
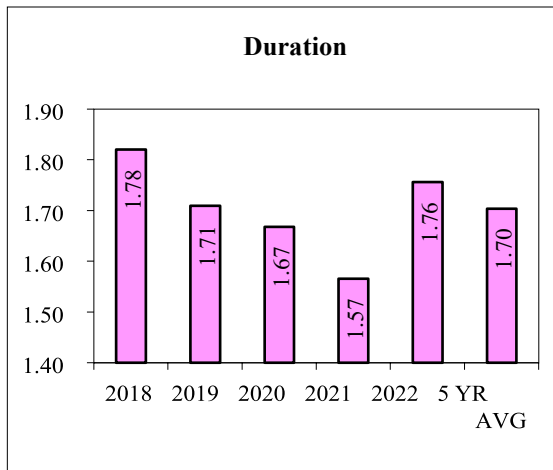
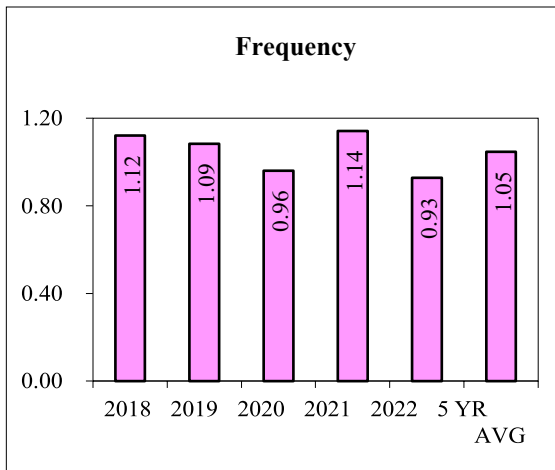
National Grid (Excluding Major Storms)



New York State Electric and Gas (Excluding Major Storms)



Orange and Rockland Utilities (Excluding Major Storms)



Rochester Gas and Electric (Excluding Major Storms)

